REVISION RECORD FOR THE STATE OF CALIFORNIA

ERRATA

January 1, 2017

2016 Title 24, Part 2, Vol. 2, California Building Code

General Information:

1. The date of these errata is for identification purposes only. See the History Note Appendix at the end of the code.
2. These errata are issued by the California Building Standards Commission in order to correct nonsubstantive printing errors or omissions in California Code of Regulations, Title 24, Part 2, Volume 2, of the 2016 *California Building Code*. Instructions are provided below.
3. Health and Safety Code Section 18938.5 establishes that only building standards in effect at the time of the application for a building permit may be applied to the project plans and construction. This rule applies to both adoptions of building standards for Title 24 by the California Building Standards Commission and local adoptions and ordinances imposing building standards. An erratum to Title 24 is a nonregulatory correction because of a printing error or omission that does not differ substantively from the official adoption by the California Building Standards Commission. Accordingly, the corrected code text provided by this erratum may be applied on and after the stated effective date.
4. You may wish to retain the superseded material with this revision record so that the prior wording of any section can be easily ascertained.

Remove Existing Pages	Insert Buff Colored Pages
xiii and xiv	xiii and xiv
xxv and xxvi	xxv and xxvi
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mable finishes, drying rooms, organic coatings and combustible storage or hydrogen fuel gas rooms, all of which are coordinated with the IFC. Unique consideration is taken for special use areas, such as covered mall buildings, motor-vehicle-related occupancies, special amusement buildings and aircraft-related occupancies. Special facilities within other occupancies are considered, such as stages and platforms, motion picture projection rooms, children's play structures and storm shelters. Finally, in order that the overall package of protection features can be easily understood, unique considerations for specific occupancies are addressed: Groups I-1, I-2, I-3, R-1, R-2, R-3, R-4, ambulatory care facilities and live/work units.

Chapter 5 General Building Heights and Areas. Chapter 5 contains the provisions that regulate the minimum type of construction for area limits and height limits based on the occupancy of the building. Height and area increases (including allowances for basements, mezzanines and equipment platforms) are permitted based on open frontage for fire department access, and the type of sprinkler protection provided and separation (Sections 503-506, 510). These thresholds are reduced for buildings over three stories in height in accordance with Sections 506.2.3 and 506.2.4. Provisions include the protection and/or separation of incidental uses (Table 509), accessory occupancies (Section 508.2) and mixed uses in the same building (Sections 506.2.2, 506.2.4, 508.3, 508.4 and 510). Unlimited area buildings are permitted in certain occupancies when they meet special provisions (Section 507).

Tables 504.3, 504.4 and 506.2 are the keystones in setting thresholds for building size based on the building's use and the materials with which it is constructed. If one then looks at Tables 504.3, 504.4 and 506.2, the relationship among group classification, allowable heights and areas and types of construction becomes apparent. Respective to each group classification, the greater the fire-resistance rating of structural elements, as represented by the type of construction, the greater the floor area and height allowances. The greater the potential fire hazards indicated as a function of the group, the lesser the height and area allowances for a particular construction type. In the 2015 edition, the table that once contained both height and area has been separated and these three new tables address the topics individually. In addition, the tables list criteria for buildings containing automatic sprinkler systems and those that do not.

Chapter 6 Types of Construction. The interdependence of these fire safety considerations can be seen by first looking at Tables 601 and 602, which show the fire-resistance ratings of the principal structural elements comprising a building in relation to the five classifications for types of construction. Type I construction is the classification that generally requires the highest fire-resistance ratings for structural elements, whereas Type V construction, which is designated as a combustible type of construction, generally requires the least amount of fire-resistance-rated structural elements. The greater the potential fire hazards indicated as a function of the group, the lesser the height and area allowances for a particular construction type. Section 603 includes a list of combustible elements that can be part of a noncombustible building (Types I and II construction).

Chapter 7 Fire and Smoke Protection Features. The provisions of Chapter 7 present the fundamental concepts of fire performance that all buildings are expected to achieve in some form. This chapter identifies the acceptable materials, techniques and methods by which proposed construction can be designed and evaluated against to determine a building's ability to limit the impact of fire. The fire-resistance-rated construction requirements within Chapter 7 provide passive resistance to the spread and effects of fire. Types of separations addressed include fire walls, fire barriers, fire partitions, horizontal assemblies, smoke barriers and smoke partitions. A fire produces heat that can weaken structural components and smoke products that cause property damage and place occupants at risk. The requirements of Chapter 7 work in unison with height and area requirements (Chapter 5), active fire detection and suppression systems (Chapter 9) and occupant egress requirements (Chapter 10) to contain a fire should it occur while helping ensure occupants are able to safely exit.

Chapter 8 Interior Finishes. This chapter contains the performance requirements for controlling fire growth within buildings by restricting interior finish and decorative materials. Past fire experience has shown that interior finish and decorative materials are key elements in the development and spread of fire. The provisions of Chapter 8 require materials used as interior finishes and decorations to meet certain flame-spread index or flame-propagation criteria based on the relative fire hazard associated with the occupancy. As smoke is also a hazard associated with fire, this chapter contains limits on the smoke development characteristics of interior finishes. The performance of the material is evaluated based on test standards.

Chapter 9 Fire Protection Systems. Chapter 9 prescribes the minimum requirements for active systems of fire protection equipment to perform the following functions: detect a fire; alert the occupants or fire department of a fire emergency; and control smoke and control or extinguish the fire. Generally, the requirements are based on the occupancy, the height and the area of the building, because these are the factors that most affect fire-fighting capabilities and the relative hazard of a specific building or portion thereof. This chapter parallels and is substantially duplicated in Chapter 9 of the *International Fire Code* (IFC); however, the IFC Chapter 9 also contains periodic testing criteria that are not contained in the IBC. In addition, the special fire protection system requirements based on use and occupancy found in IBC Chapter 4 are duplicated in IFC Chapter 9 as a user convenience.

Chapter 10 Means of Egress. The general criteria set forth in Chapter 10 regulating the design of the means of egress are established as the primary method for protection of people in buildings by allowing timely relocation or evacuation of building occupants. Both prescriptive and performance language is utilized in this chapter to provide for a basic approach in the determination of a safe exiting system for all occupancies. It addresses all portions of the egress system (i.e., exit access, exits and exit discharge) and includes design requirements as well as provisions regulating individual components. The requirements detail the size, arrangement, number and protection of means of egress components. Functional and operational characteristics also are specified for the components that will permit their safe use without special knowledge or effort. The means of egress protection requirements work in coordination with other sections of the code, such as protection of vertical openings (see Chapter 7), interior finish (see Chapter 8), fire suppression and detection systems (see Chapter 9) and numerous others, all having an impact on life safety. Chapter 10 of the IBC is duplicated in Chapter 10 of the IFC; however, the IFC contains one additional section on the means of egress system in existing buildings.

Chapter 11A - Housing Accessibility and/or Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing. Verify compliance with accessibility provisions. In order to be considered as accessible, buildings and their individual elements must comply with the applicable scoping and technical provisions of Chapter 11A and/or Chapter 11B.

Chapter 12 Interior Environment. Chapter 12 provides minimum standards for the interior environment of a building. The standards address the minimum sizes of spaces, minimum temperature levels, and minimum light and ventilation levels. The collection of requirements addresses limiting sound transmission through walls, ventilation of attic spaces and under floor spaces (crawl spaces). Finally, the chapter provides minimum standards for toilet and bathroom construction, including privacy shielding and standards for walls, partitions and floors to resist water intrusion and damage.

Chapter 13 Energy Efficiency. The purpose of Chapter 13 is to provide minimum design requirements that will promote efficient utilization of energy in buildings. The requirements are directed toward the design of building envelopes with adequate thermal resistance and low air leakage, and toward the design and selection of mechanical, water heating, electrical and illumina-

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CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 16 – STRUCTURAL DESIGN

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	**BSC**	**BSC-CG**	**SFM**	**HCD**			**DSA**			**OSHPD**				**BSCC**	**DPH**	**AGR**	**DWR**	**CEC**	**CA**	**SL**	**SLC**
				1	**2**	**1/AC**	**AC**	**SS**	**SS/CC**	**1**	**2**	**3**	**4**								
Adopt entire chapter												**X**									
Adopt entire chapter as amended (amended sections listed below)	**X**			**X**	**X**				**X**		**X**										
Adopt only those sections that are listed below						**X**	**X**													**X**	
Chapter / Section																					
1601.1.1									X												
1601.1.2									X												
1601.1.3									X												
1601.1.4									X												
1601.2									X		X										
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1607.1, Table 1607.1											X										
1607.8						X															
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1613.5	X										X										
1613.5.1, *Exception*											X										
1616									X												

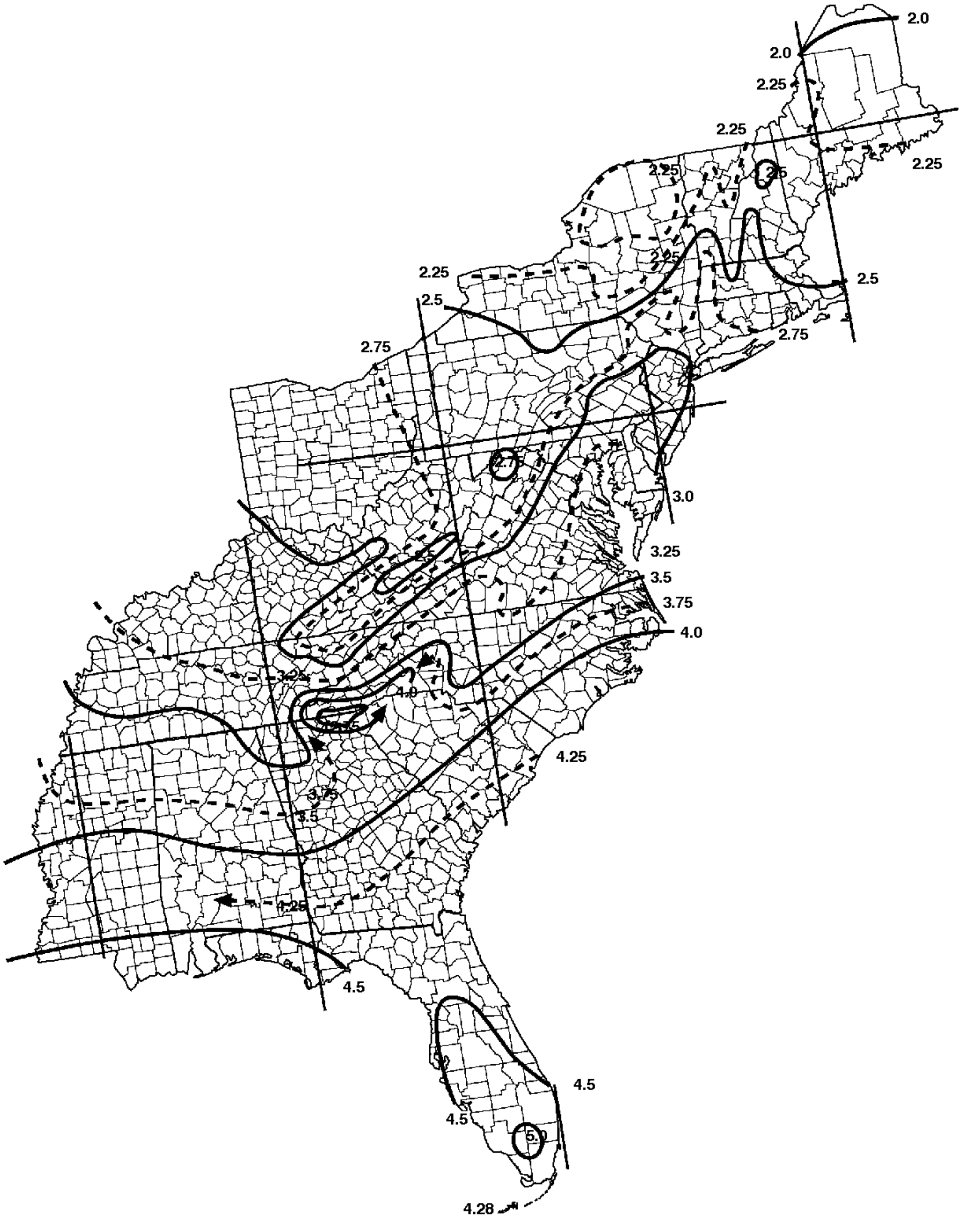
The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

3. Agricultural storage structures intended only for incidental human occupancy.
4. Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.
5. *[OSHPD 2] Seismic Design Category shall be in accordance with exception to Section 1613.3.5.*

1613.1.1 Scope. [SL] *For applications listed in Section 1.12 regulated by the State Librarian, only the provisions of ASCE 7 Tables 13.5-1 and 1607.1, as amended, of this code shall apply.*

1613.1.2 State-owned buildings. [BSC] *State-owned buildings, including those of the University of California, CSU and Judicial Council, shall not be constructed where any portion of the foundation would be within a mapped*



[P] FIGURE 1611.1—continued
100-YEAR, 1-HOUR RAINFALL (INCHES) EASTERN UNITED STATES

For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

area of earthquake-induced liquefaction or landsliding or within 50 feet of a mapped fault rupture hazard as established by Section 1803.7.

1613.1.3 Existing state buildings. [BSC] *Additions, alterations, repairs or change of occupancy category of existing buildings shall be in accordance with the California Existing Building Code, Part 10.*

1613.2 Definitions. The following terms are defined in Chapter 2:

DESIGN EARTHQUAKE GROUND MOTION.

MECHANICAL SYSTEMS.

ORTHOGONAL.

RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE_R) GROUND MOTION RESPONSE ACCELERATION.

SEISMIC DESIGN CATEGORY.

SEISMIC FORCE-RESISTING SYSTEM.

SITE CLASS.

SITE COEFFICIENTS.

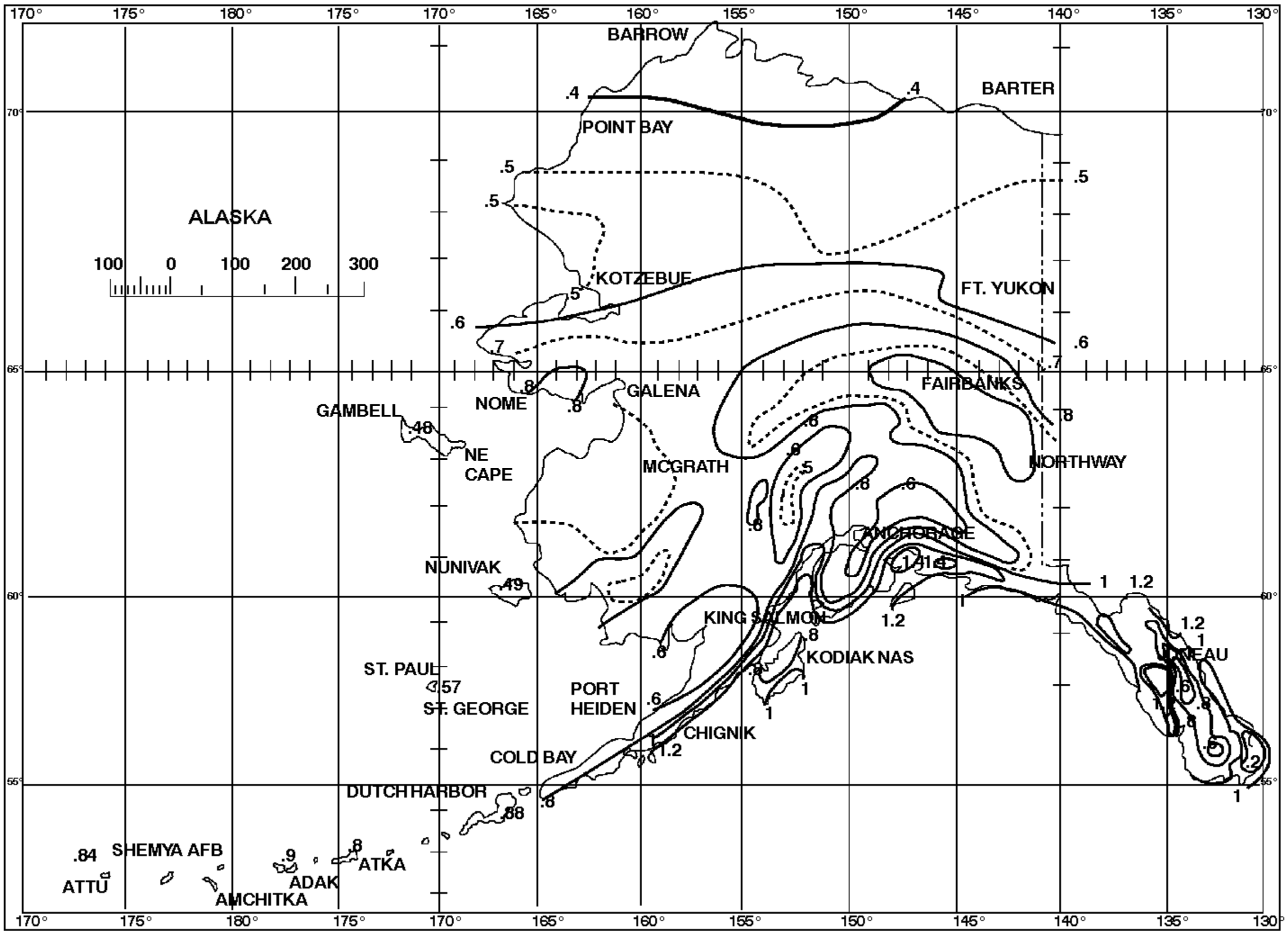
1613.3 Seismic ground motion values. Seismic ground motion values shall be determined in accordance with this section.

1613.3.1 Mapped acceleration parameters. The parameters S_S and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.3.1(1) through 1613.3.1(6). Where S_1 is less than or equal to 0.04 and S_S is less than or equal to 0.15, the structure is permitted to be assigned Seismic Design Category A.

Exception: [OSHPD 2] *Seismic Design Category shall be in accordance with exception to Section 1613.3.5.*

1613.3.2 Site class definitions. Based on the site soil properties, the site shall be classified as Site Class A, B, C, D, E or F in accordance with Chapter 20 of ASCE 7.

Where the soil properties are not known in sufficient detail to determine the site class, Site Class D shall be used unless the building official or geotechnical data determines Site Class E or F soils are present at the site.



[P] FIGURE 1611.1—continued
100-YEAR, 1-HOUR RAINFALL (INCHES) ALASKA

For SI: 1 inch = 25.4 mm.

Source: National Weather Service, National Oceanic and Atmospheric Administration, Washington, DC.

1605*A*.3.1.2 Other loads. Where flood loads, F_a, are to be considered in design, the load combinations of Section 2.4.2 of ASCE 7 shall be used. Where self-straining loads, T, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7. Where an ice-sensitive structure is subjected to loads due to atmospheric icing, the load combinations of Section 2.4.3 of ASCE 7 shall be considered.

1605*A*.3.2 Alternative basic load combinations. In lieu of the basic load combinations specified in Section 1605*A*.3.1, structures and portions thereof shall be permitted to be designed for the most critical effects resulting from the following combinations. When using these alternative basic load combinations that include wind or seismic loads, allowable stresses are permitted to be increased or load combinations reduced where permitted by the material chapter of this code or the referenced standards. For load combinations that include the counteracting effects of dead and wind loads, only two-thirds of the minimum dead load likely to be in place during a design wind event shall be used. When using allowable stresses that have been increased or load combinations that have been reduced as permitted by the material chapter of this code or the referenced standards, where wind loads are calculated in accordance with Chapters 26 through 31 of ASCE 7, the coefficient (ω) in the following equations shall be taken as 1.3. For other wind loads, (ω) shall be taken as 1. When allowable stresses have not been increased or load combinations have not been reduced as permitted by the material chapter of this code or the referenced standards, (ω) shall be taken as 1. When using these alternative load combinations to evaluate sliding, overturning and soil bearing at the soil-structure interface, the reduction of foundation overturning from Section 12.13.4 in ASCE 7 shall not be used. When using these alternative basic load combinations for proportioning foundations for loadings, which include seismic loads, the vertical seismic load effect, E_v, in Equation 12.4-4 of ASCE 7 is permitted to be taken equal to zero.

$D + L + (L_r \text{ or } S \text{ or } R)$ **(Equation 16*A*-17)**

$D + L + 0.6\ \omega W$ **(Equation 16*A*-18)**

$D + L + 0.6\ \omega W + S/2$ **(Equation 16*A*-19)**

$D + L + S + 0.6\ \omega W/2$ **(Equation 16*A*-20)**

$D + L + S + E/1.4$ **(Equation 16*A*-21)**

$0.9D + E/1.4$ **(Equation 16*A*-22)**

Exceptions:

1. Crane hook loads need not be combined with roof live loads or with more than three-fourths of the snow load or one-half of the wind load.
2. Flat roof snow loads of 30 psf (1.44 kN/m^2) or less and roof live loads of 30 psf (1.44 kN/m^2) or less need not be combined with seismic loads. Where flat roof snow loads exceed 30 psf (1.44 kN/m^2), 20 percent shall be combined with seismic loads.

1605*A*.3.2.1 Other loads. Where F, H or T are to be considered in the design, each applicable load shall be added to the combinations specified in Section 1605*A*.3.2. Where self-straining loads, T, are considered in design, their structural effects in combination with other loads shall be determined in accordance with Section 2.4.4 of ASCE 7.

SECTION 1606*A*
DEAD LOADS

1606*A*.1 General. Dead loads are those loads defined in Chapter 2 of this code. Dead loads shall be considered permanent loads.

1606*A*.2 Design dead load. For purposes of design, the actual weights of materials of construction and fixed service equipment shall be used. In the absence of definite information, values used shall be subject to the approval of the building official.

1606A.3 Roof dead loads. *The design dead load shall provide for the weight of at least one additional roof covering in addition to other applicable loadings if the new roof covering is permitted to be applied over the original roofing without its removal, in accordance with Section 1511.*

SECTION 1607*A*
LIVE LOADS

1607*A*.1 General. Live loads are those loads defined in *Chapter 2 and Section 1602A.1 of this code.* | |

1607*A*.2 Loads not specified. For occupancies or uses not designated in Table 1607*A*.1, the live load shall be determined in accordance with a method approved by the building official.

1607*A*.3 Uniform live loads. The live loads used in the design of buildings and other structures shall be the maximum loads expected by the intended use or occupancy but shall in no case be less than the minimum uniformly distributed live loads given in Table 1607*A*.1.

1607*A*.4 Concentrated live loads. Floors and other similar surfaces shall be designed to support the uniformly distributed live loads prescribed in Section 1607*A*.3 or the concentrated live loads, given in Table 1607*A*.1, whichever produces the greater load effects. Unless otherwise specified, the indicated concentration shall be assumed to be uniformly distributed over an area of $2^1/_2$ feet by $2^1/_2$ feet (762 mm by 762 mm) and shall be located so as to produce the maximum load effects in the structural members.

1607*A*.5 Partition loads. In office buildings and in other buildings where partition locations are subject to change, provisions for partition weight shall be made, whether or not partitions are shown on the construction documents, unless the specified live load is 80 psf (3.83 kN/m^2) or greater. The partition load shall be not less than a uniformly distributed live load of 15 psf (0.72 kN/m^2).

TABLE 1607*A*.1
MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_o, AND MINIMUM CONCENTRATED LIVE LOADS[g]

OCCUPANCY OR USE	UNIFORM (psf)	CONCENTRATED (lbs.)
1. Apartments (see residential)	—	—
2. Access floor systems		
Office use	50	2,000
Computer use	100	2,000
3. Armories and drill rooms	150[m]	—
4. Assembly areas[o, q]		—
Fixed seats (fastened to floor)	60[m]	
Follow spot, projections and control rooms	50	
Lobbies	100[m]	
Movable seats	100[m]	
Stage floors	150[m]	
Platforms (assembly)	100[m]	
Other assembly areas	100[m]	
5. Balconies and decks[h]	Same as occupancy served	—
6. Catwalks	40	300
7. Cornices	60	—
8. Corridors		—
First floor	100	
Other floors	Same as occupancy served except as indicated	
9. Dining rooms and restaurants	100[m]	—
10. Dwellings (see residential)	—	—
11. Elevator machine room and control room grating (on area of 2 inches by 2 inches)	—	300
12. Finish light floor plate construction (on area of 1 inch by 1 inch)	—	200
13. Fire escapes	100	—
On single-family dwellings only	40	
14. Garages (passenger vehicles only)	40[m]	Note a
Trucks and buses	See Section 1607.7	
15. Handrails, guards and grab bars	See Section 1607.8	
16. Helipads	See Section 1607.6	
17. Hospitals *[OSHPD 1 & 4]*		
Corridors above first floor	80	1,000
Operating rooms, laboratories	60	1,000
Patient rooms	40	1,000
Mechanical and electrical equipment areas including open areas around equipment	*50*	
Storage		
Light	*125*	
Heavy	*250*	
Dining Area (not used for assembly)	*100*	*1,000*
Kitchen and serving areas	*50*	*1,000*
18. Hotels (see residential)	—	—
19. Libraries[n]		
Corridors above first floor	80	1,000
Reading rooms	60[m]	1,000
Stack rooms	150[b, m]	1,000
20. Manufacturing		
Heavy	250[m]	3,000
Light	125[m]	2,000
21. Marquees, except one- and two-family dwellings	75	—
22. Office buildings[n]		
Corridors above first floor	80	2,000
File and computer rooms shall be designed for heavier loads based on anticipated occupancy	—	—
Lobbies and first-floor corridors	100	2,000
Offices	50	2,000
23. Penal institutions		
Cell blocks	40	—
Corridors	100	
24. Recreational uses:		—
Bowling alleys, poolrooms and similar uses	75[m]	
Dance halls and ballrooms	100[m]	
Gymnasiums	100[m]	
Ice skating rink	250[m]	
Reviewing stands, grandstands and bleachers[q]	100[c, m]	
Roller skating rink	100[m]	
Stadiums and arenas with fixed seats (fastened to floor)	60[c, m]	
25. Residential		—
One- and two-family dwellings		
Uninhabitable attics without storage[i]	10	
Uninhabitable attics with storage[i, j, k]	20	
Habitable attics and sleeping areas[k]	30	
Canopies, including marquees	20	
All other areas	40	
Hotels and multifamily dwellings		
Private rooms and corridors serving them	40	
Public rooms[m] and corridors serving them	100	
26. Roofs		
All roof surfaces subject to maintenance workers		300
Awnings and canopies:		
Fabric construction supported by a skeleton structure	5 Nonreducible	
All other construction, except one- and two-family dwellings	20	
Ordinary flat, pitched, and curved roofs (that are not occupiable)	20	
Primary roof members exposed to a work floor		
Single panel point of lower chord of roof trusses or any point along primary structural members supporting roofs over manufacturing, storage warehouses, and repair garages		2,000
All other primary roof members		300
Occupiable roofs:		
Roof gardens	100	
Assembly areas	100[m]	
All other similar areas	Note 1	Note 1
27. Schools[n]		
Classrooms	40[p]	1,000
Corridors above first floor	80	1,000
First-floor corridors	100	1,000
28. Scuttles, skylight ribs and accessible ceilings	—	200
29. Sidewalks, vehicular drive ways and yards, subject to trucking	250[d, m]	8,000[e]

(continued)

cessible. Roof surfaces not covered by photovoltaic panels shall be designed for the roof live load.

1607*A*.12.5.2 Photovoltaic panels or modules. The structure of a roof that supports solar photovoltaic panels or modules shall be designed to accommodate the full solar photovoltaic panels or modules and ballast dead load, including concentrated loads from support frames in combination with the loads from Section 1607*A*.12.5.1 and other applicable loads. Where applicable, snow drift loads created by the photovoltaic panels or modules shall be included.

1607*A*.12.5.3 Photovoltaic panels or modules installed as an independent structure. Solar photovoltaic panels or modules that are independent structures and do not have accessible/occupied space underneath are not required to accommodate a roof photovoltaic live load, provided the area under the structure is restricted to keep the public away. All other loads and combinations in accordance with Section 1605*A* shall be accommodated.

Solar photovoltaic panels or modules that are designed to be the roof, span to structural supports and have accessible/occupied space underneath shall have the panels or modules and all supporting structures designed to support a roof photovoltaic live load, as defined in Section 1607*A*.12.5.1 in combination with other applicable loads. Solar photovoltaic panels or modules in this application are not permitted to be classified as "not accessible" in accordance with Section 1607*A*.12.5.1.

1607*A*.12.5.4 Ballasted photovoltaic panel systems. Roof structures that provide support for ballasted photovoltaic panel systems shall be designed, or analyzed, in accordance with Section 1604*A*.4; checked in accordance with Section 1604*A*.3.6 for deflections; and checked in accordance with Section 1611*A* for ponding.

1607A.12.6 Uncovered open-frame roof structures. *Uncovered open-frame roof structures shall be designed for a vertical live load of not less than 10 pounds per square foot (0.48 kN/m^2) of the total area encompassed by the framework.*

1607*A*.13 Crane loads. The crane live load shall be the rated capacity of the crane. Design loads for the runway beams, including connections and support brackets, of moving bridge cranes and monorail cranes shall include the maximum wheel loads of the crane and the vertical impact, lateral and longitudinal forces induced by the moving crane.

1607*A*.13.1 Maximum wheel load. The maximum wheel loads shall be the wheel loads produced by the weight of the bridge, as applicable, plus the sum of the rated capacity and the weight of the trolley with the trolley positioned on its runway at the location where the resulting load effect is maximum.

1607*A*.13.2 Vertical impact force. The maximum wheel loads of the crane shall be increased by the percentages shown below to determine the induced vertical impact or vibration force:

Monorail cranes (powered)	25 percent
Cab-operated or remotely operated bridge cranes (powered)	25 percent
Pendant-operated bridge cranes (powered)	10 percent
Bridge cranes or monorail cranes with hand-geared bridge, trolley and hoist	0 percent

1607*A*.13.3 Lateral force. The lateral force on crane runway beams with electrically powered trolleys shall be calculated as 20 percent of the sum of the rated capacity of the crane and the weight of the hoist and trolley. The lateral force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction perpendicular to the beam, and shall be distributed with due regard to the lateral stiffness of the runway beam and supporting structure.

1607*A*.13.4 Longitudinal force. The longitudinal force on crane runway beams, except for bridge cranes with hand-geared bridges, shall be calculated as 10 percent of the maximum wheel loads of the crane. The longitudinal force shall be assumed to act horizontally at the traction surface of a runway beam, in either direction parallel to the beam.

1607A.14 **Interior walls and partitions.** Interior walls and partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength and stiffness to resist the loads to which they are subjected but not less than a horizontal load of 5 psf (0.240 kN/m^2). *The 5 psf (0.24 kN/m^2) service load need not be applied simultaneously with wind or seismic loads. The deflection of such walls under a load of 5 psf (0.24 kN/m^2) shall not exceed the limits in Table 1604A.3.*

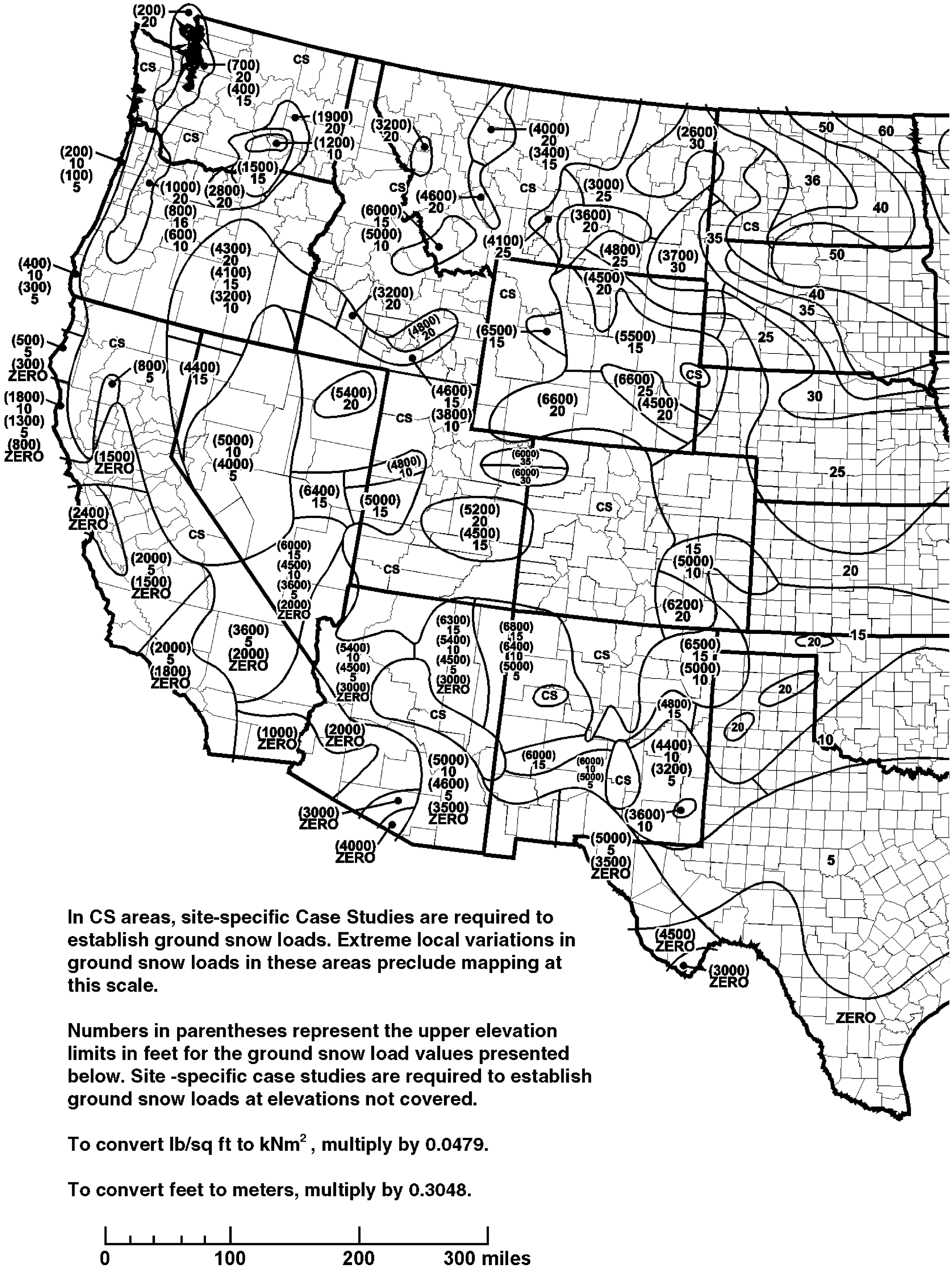
1607*A*.14.1 Fabric partitions. Fabric partitions that exceed 6 feet (1829 mm) in height, including their finish materials, shall have adequate strength and stiffness to resist the following load conditions:

1. The horizontal distributed load need only be applied to the partition framing. The total area used to determine the distributed load shall be the area of the fabric face between the framing members to which the fabric is attached. The total distributed load shall be uniformly applied to such framing members in proportion to the length of each member.
2. A concentrated load of 40 pounds (0.176 kN) applied to an 8-inch-diameter (203 mm) area [50.3 square inches (32 452 mm^2)] of the fabric face at a height of 54 inches (1372 mm) above the floor.

SECTION 1608*A*
SNOW LOADS

1608*A*.1 General. Design snow loads shall be determined in accordance with Chapter 7 of ASCE 7, but t he design roof load shall not be less than that determined by Section 1607*A*.

1608*A*.2 Ground snow loads. The ground snow loads to be used in determining the design snow loads for roofs shall be determined in accordance with ASCE 7 or Figure 1608*A*.2 for the contiguous United States. Site-specific case studies shall be made in areas designated "CS" in Figure 1608*A*.2. Ground snow loads for sites at elevations above the limits indicated in Figure 1608*A*.2 and for all sites within the CS areas shall be approved. Ground snow load determination for such sites shall be based on an extreme value statistical analysis of data available in the vicinity of the site using a value with a 2-percent annual probability of being exceeded (50-year mean recurrence interval).



In CS areas, site-specific Case Studies are required to establish ground snow loads. Extreme local variations in ground snow loads in these areas preclude mapping at this scale.

Numbers in parentheses represent the upper elevation limits in feet for the ground snow load values presented below. Site -specific case studies are required to establish ground snow loads at elevations not covered.

To convert lb/sq ft to kNm^2, multiply by 0.0479.

To convert feet to meters, multiply by 0.3048.

FIGURE 1608*A*.2
GROUND SNOW LOADS, p_g, FOR THE UNITED STATES (psf)

TABLE 1609*A*.3.1 WIND SPEED CONVERSIONS[a, b, c]

V_{ult}	100	110	120	130	140	150	160	170	180	190	200
V_{asd}	78	85	93	101	108	116	124	132	139	147	155

For SI: 1 mile per hour = 0.44 m/s.

a. Linear interpolation is permitted.

b. V_{asd} = nominal design wind speed applicable to methods specified in Exceptions 1 through 5 of Section 1609*A*.1.1.

c. V_{ult} = ultimate design wind speeds determined from Figure 1609*A*.3(1), 1609*A*.3(2) or 1609*A*.3(3).

1609*A*.4 Exposure category. For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. Account shall be taken of variations in ground surface roughness that arise from natural topography and vegetation as well as from constructed features.

1609*A*.4.1 Wind directions and sectors. For each selected wind direction at which the wind loads are to be evaluated, the exposure of the building or structure shall be determined for the two upwind sectors extending 45 degrees (0.79 rad) either side of the selected wind direction. The exposures in these two sectors shall be determined in accordance with Sections 1609*A*.4.2 and 1609*A*.4.3 and the exposure resulting in the highest wind loads shall be used to represent winds from that direction.

1609*A*.4.2 Surface roughness categories. A ground surface roughness within each 45-degree (0.79 rad) sector shall be determined for a distance upwind of the site as defined in Section 1609*A*.4.3 from the categories defined below, for the purpose of assigning an exposure category as defined in Section 1609*A*.4.3.

Surface Roughness B. Urban and suburban areas, wooded areas or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger.

Surface Roughness C. Open terrain with scattered obstructions having heights generally less than 30 feet (9144 mm). This category includes flat open country, and grasslands.

Surface Roughness D. Flat, unobstructed areas and water surfaces. This category includes smooth mud flats, salt flats and unbroken ice.

1609*A*.4.3 Exposure categories. An exposure category shall be determined in accordance with the following:

Exposure B. For buildings with a mean roof height of less than or equal to 30 feet (9144 mm), Exposure B shall apply where the ground surface roughness, as defined by Surface Roughness B, prevails in the upwind direction for a distance of at least 1,500 feet (457 m). For buildings with a mean roof height greater than 30 feet (9144 mm), Exposure B shall apply where Surface Roughness B prevails in the upwind direction for a distance of at least 2,600 feet (792 m) or 20 times the height of the building, whichever is greater.

Exposure C. Exposure C shall apply for all cases where Exposure B or D does not apply.

Exposure D. Exposure D shall apply where the ground surface roughness, as defined by Surface Roughness D, prevails in the upwind direction for a distance of at least 5,000 feet (1524 m) or 20 times the height of the building, whichever is greater. Exposure D shall also apply where the ground surface roughness immediately upwind of the site is B or C, and the site is within a distance of 600 feet (183 m) or 20 times the building height, whichever is greater, from an Exposure D condition as defined in the previous sentence.

1609*A*.5 Roof systems. Roof systems shall be designed and constructed in accordance with Sections 1609*A*.5.1 through 1609*A*.5.3, as applicable.

1609*A*.5.1 Roof deck. The roof deck shall be designed to withstand the wind pressures determined in accordance with ASCE 7.

1609*A*.5.2 Roof coverings. Roof coverings shall comply with Section 1609*A*.5.1.

Exception: Rigid tile roof coverings that are air permeable and installed over a roof deck complying with Section 1609*A*.5.1 are permitted to be designed in accordance with Section 1609*A*.5.3.

Asphalt shingles installed over a roof deck complying with Section 1609*A*.5.1 shall comply with the wind-resistance requirements of Section 1504.1.1.

1609*A*.5.3 Rigid tile. Wind loads on rigid tile roof coverings shall be determined in accordance with the following equation:

$$M_a = q_h C_L b L L_a [1.0 - GC_p] \qquad \textbf{(Equation 16A-34)}$$

For SI:

$$M_a = \frac{q_h C_L b L L_a [1.0 - GC_p]}{1,000}$$

where:

b = Exposed width, feet (mm) of the roof tile.

C_L = Lift coefficient. The lift coefficient for concrete and clay tile shall be 0.2 or shall be determined by test in accordance with Section 1504.2.1.

GC_p = Roof pressure coefficient for each applicable roof zone determined from Chapter 30 of ASCE 7. Roof coefficients shall not be adjusted for internal pressure.

L = Length, feet (mm) of the roof tile.

L_a = Moment arm, feet (mm) from the axis of rotation to the point of uplift on the roof tile. The point of uplift shall be taken at $0.76L$ from the head of the tile and the middle of the exposed width. For roof tiles with nails or screws (with or without a tail clip), the axis of rotation shall be taken as the head of the tile for direct deck application or as the top edge of the batten for battened applications. For roof tiles fastened only by a nail or screw along the side of the tile, the axis of rotation shall be determined by testing. For roof tiles installed with battens and fastened only by a clip near the tail of the tile, the moment arm shall be determined about the top edge of the batten with consideration given for the point of rotation of the tiles based on straight bond or broken bond and the tile profile.

M_a = Aerodynamic uplift moment, feet-pounds (N-mm) acting to raise the tail of the tile.

q_h = Wind velocity pressure, psf (kN/m^2) determined from Section 27.3.2 of ASCE 7.

Concrete and clay roof tiles complying with the following limitations shall be designed to withstand the aerodynamic uplift moment as determined by this section.

1. The roof tiles shall be either loose laid on battens, mechanically fastened, mortar set or adhesive set.
2. The roof tiles shall be installed on solid sheathing that has been designed as components and cladding.
3. An underlayment shall be installed in accordance with Chapter 15.
4. The tile shall be single lapped interlocking with a minimum head lap of not less than 2 inches (51 mm).
5. The length of the tile shall be between 1.0 and 1.75 feet (305 mm and 533 mm).
6. The exposed width of the tile shall be between 0.67 and 1.25 feet (204 mm and 381 mm).
7. The maximum thickness of the tail of the tile shall not exceed 1.3 inches (33 mm).
8. Roof tiles using mortar set or adhesive set systems shall have at least two-thirds of the tile's area free of mortar or adhesive contact.

1609*A*.6 Alternate all-heights method. The alternate wind design provisions in this section are simplifications of the ASCE 7 Directional Procedure.

1609*A*.6.1 Scope. As an alternative to ASCE 7 Chapters 27 and 30, the following provisions are permitted to be used to determine the wind effects on regularly shaped buildings, or other structures that are regularly shaped, that meet all of the following conditions:

1. The building or other structure is less than or equal to 75 feet (22 860 mm) in height with a height-to-least-width ratio of 4 or less, or the building or other structure has a fundamental frequency greater than or equal to 1 hertz.
2. The building or other structure is not sensitive to dynamic effects.
3. The building or other structure is not located on a site for which channeling effects or buffeting in the wake of upwind obstructions warrant special consideration.
4. The building shall meet the requirements of a simple diaphragm building as defined in ASCE 7 Section 26.2, where wind loads are only transmitted to the main windforce-resisting system (MWFRS) at the diaphragms.
5. For open buildings, multispan gable roofs, stepped roofs, sawtooth roofs, domed roofs, roofs with slopes greater than 45 degrees (0.79 rad), solid freestanding walls and solid signs, and rooftop equipment, apply ASCE 7 provisions.

1609*A*.6.1.1 Modifications. The following modifications shall be made to certain subsections in ASCE 7: in Section 1609*A*.6.2, symbols and notations that are specific to this section are used in conjunction with the symbols and notations in ASCE 7 Section 26.3.

1609*A*.6.2 Symbols and notations. Coefficients and variables used in the alternative all-heights method equations are as follows:

C_{net}= Net-pressure coefficient based on K_d $[(G)\ (C_p)$ - $(GC_{pi})]$, in accordance with Table 1609*A*.6.2.

G = Gust effect factor for rigid structures in accordance with ASCE 7 Section 26.9.1.

K_d = Wind directionality factor in accordance with ASCE 7 Table 26-6.

P_{net}= Design wind pressure to be used in determination of wind loads on buildings or other structures or their components and cladding, in psf (kN/m^2).

1609*A*.6.3 Design equations. When using the alternative all-heights method, the MWFRS, and components and cladding of every structure shall be designed to resist the effects of wind pressures on the building envelope in accordance with Equation 16*A*-35.

$$P_{net} = 0.00256V^2K_zC_{net}K_{zt} \qquad \textbf{(Equation 16A-35)}$$

Design wind forces for the MWFRS shall be not less than 16 psf (0.77 kN/m^2) multiplied by the area of the structure projected on a plane normal to the assumed wind direction (see ASCE 7 Section 27.4.7 for criteria). Design net wind pressure for components and cladding shall be not less than 16 psf (0.77 kN/m^2) acting in either direction normal to the surface.

1609*A*.6.4 Design procedure. The MWFRS and the components and cladding of every building or other structure shall be designed for the pressures calculated using Equation 16*A*-35.

1609*A*.6.4.1 Main wind force-resisting systems. The MWFRS shall be investigated for the torsional effects identified in ASCE 7 Figure 27.4-8.

1611*A*.3 Controlled drainage. Roofs equipped with hardware to control the rate of drainage shall be equipped with a secondary drainage system at a higher elevation that limits accumulation of water on the roof above that elevation. Such roofs shall be designed to sustain the load of rainwater that will accumulate on them to the elevation of the secondary drainage system plus the uniform load caused by water that rises above the inlet of the secondary drainage system at its design flow determined from Section 1611*A*.1. Such roofs shall also be checked for ponding instability in accordance with Section 1611*A*.2.

SECTION 1612*A*
FLOOD LOADS

1612*A*.1 General. Within flood hazard areas as established in Section 1612*A*.3, all new construction of buildings, structures and portions of buildings and structures, including substantial improvement and restoration of substantial damage to buildings and structures, shall be designed and constructed to resist the effects of flood hazards and flood loads. For buildings that are located in more than one flood hazard area, the provisions associated with the most restrictive flood hazard area shall apply.

1612*A*.2 Definitions. The following words and terms are defined in Chapter 2.

BASE FLOOD.

BASE FLOOD ELEVATION.

BASEMENT.

COASTAL A ZONE.

COASTAL HIGH HAZARD AREA.

DESIGN FLOOD.

DESIGN FLOOD ELEVATION.

DRY FLOODPROOFING.

EXISTING CONSTRUCTION.

EXISTING STRUCTURE.

FLOOD or FLOODING.

FLOOD DAMAGE-RESISTANT MATERIALS.

FLOOD HAZARD AREA.

FLOOD INSURANCE RATE MAP (FIRM).

FLOOD INSURANCE STUDY.

FLOODWAY.

LOWEST FLOOR.

SPECIAL FLOOD HAZARD AREA.

START OF CONSTRUCTION.

SUBSTANTIAL DAMAGE.

SUBSTANTIAL IMPROVEMENT.

1612*A*.3 Establishment of flood hazard areas. To establish flood hazard areas, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management *Agency's Flood Insurance Study (FIS) adopted by the local authority having jurisdiction where the project is located,* as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

1612*A*.3.1 Design flood elevations. Where design flood elevations are not included in the flood hazard areas established in Section 1612*A*.3, or where floodways are not designated, the building official is authorized to require the applicant to:

1. Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state or other source; or
2. Determine the design flood elevation and/or floodway in accordance with accepted hydrologic and hydraulic engineering practices used to define special flood hazard areas. Determinations shall be undertaken by a registered design professional who shall document that the technical methods used reflect currently accepted engineering practice.

1612*A*.3.2 Determination of impacts. In riverine flood hazard areas where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed work will not increase the design flood elevation more than 1 foot (305 mm) at any point within the jurisdiction of the applicable governing authority.

1612*A*.4 Design and construction. The design and construction of buildings and structures located in flood hazard areas, including coastal high hazard areas and coastal A zones, shall be in accordance with Chapter 5 of ASCE 7 and ASCE 24.

1612*A*.5 Flood hazard documentation. The following documentation shall be prepared and sealed by a registered design professional and submitted to the building official:

1. For construction in flood hazard areas other than coastal high hazard areas or coastal A zones:
    - 1.1. The elevation of the lowest floor, including the basement, as required by the lowest floor elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.10.1.
    - 1.2. For fully enclosed areas below the design flood elevation where provisions to allow for the automatic entry and exit of floodwaters do not meet the minimum requirements in Section 2.6.2.1 of ASCE 24, construction documents shall include a statement that the design will provide for equalization of hydrostatic flood forces in accordance with Section 2.6.2.2 of ASCE 24.
    - 1.3. For dry floodproofed nonresidential buildings, construction documents shall include a statement that the dry floodproofing is designed in accordance with ASCE 24.

2. For construction in coastal high hazard areas and coastal A zones:
    2.1. The elevation of the bottom of the lowest horizontal structural member as required by the lowest floor elevation inspection in Section 110.3.3 and for the final inspection in Section 110.3.10.1.
    2.2. Construction documents shall include a statement that the building is designed in accordance with ASCE 24, including that the pile or column foundation and building or structure to be attached thereto is designed to be anchored to resist flotation, collapse and lateral movement due to the effects of wind and flood loads acting simultaneously on all building components, and other load requirements of Chapter 16.
    2.3. For breakaway walls designed to have a resistance of more than 20 psf (0.96 kN/m^2) determined using allowable stress design, construction documents shall include a statement that the breakaway wall is designed in accordance with ASCE 24.

SECTION 1613*A*
EARTHQUAKE LOADS

1613*A*.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with ASCE 7 *with all the modifications incorporated herein,* excluding Chapter 14 and Appendix 11A. The seismic design category for a structure *shall* be determined in accordance with Section 1613*A*.

Exception: Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.

1613*A*.2 Definitions. The following terms are defined in Chapter 2*, except those defined below which shall, for the purposes of this section, have the meanings shown herein. Definition provided in ASCE 7 Section 11.2 and* ***[OSHPD 1 & 4]*** *Section 3402A.1 shall apply when appropriate in addition to terms defined in this section.*

ACTIVE EARTHQUAKE FAULT. *A fault that has been the source of earthquakes or is recognized as a potential source of earthquakes, including those that have exhibited surface displacement within Holocene time (about 11,000 years) as determined by California Geological Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act, those included as type A or type B faults for the U.S. Geological Survey (USGS) National Seismic Hazard Maps, and faults considered to have been active in Holocene time by any authoritative source, federal, state or local governmental agency.*

BASE. *See ASCE 7.*

DESIGN EARTHQUAKE GROUND MOTION.

DISTANCE FROM AN ACTIVE EARTHQUAKE FAULT. *Distance measured from the nearest point of the building to the closest edge of an Alquist-Priolo Earthquake Fault Zone for an active fault, if such a map exists, or to the closest mapped splay of the fault.*

GENERAL ACUTE CARE HOSPITAL. *See Section 1224.3.*

IRREGULAR STRUCTURE. *A structure designed as having one or more plan or vertical irregularities per ASCE 7 Section 12.3.*

MECHANICAL SYSTEMS.

ORTHOGONAL.

RISK-TARGETED MAXIMUM CONSIDERED EARTHQUAKE (MCE$_R$) GROUND MOTION RESPONSE ACCELERATION.

SEISMIC DESIGN CATEGORY.

SEISMIC FORCE-RESISTING SYSTEM.

SITE CLASS.

SITE COEFFICIENTS.

1613*A*.3 Seismic ground motion values. Seismic ground motion values shall be determined in accordance with this section.

1613*A*.3.1 Mapped acceleration parameters. The parameters S_S and S_1 shall be determined from the 0.2 and 1-second spectral response accelerations shown on Figures 1613.3.1(1) through 1613.3.1(6).

1613*A*.3.2 Site class definitions. Based on the site soil properties, the site shall be classified as Site Class A, B, C, D, E or F in accordance with Chapter 20 of ASCE 7.

Where the soil properties are not known in sufficient detail to determine the site class, Site Class D shall be used unless the building official or geotechnical data determines Site Class E or F soils are present at the site.

1613*A*.3.3 Site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters. The maximum considered earthquake spectral response acceleration for short periods, S_{MS}, and at 1-second period, S_{M1}, adjusted for site class effects shall be determined by Equations 16*A*-37 and 16*A*-38, respectively:

$$S_{MS} = F_a S_s \qquad \textbf{(Equation 16A-37)}$$

$$S_{M1} = F_v S_1 \qquad \textbf{(Equation 16A-38)}$$

where:

F_a = Site coefficient defined in Table 1613*A*.3.3(1).

F_v = Site coefficient defined in Table 1613*A*.3.3(2).

S_S = The mapped spectral accelerations for short periods as determined in Section 1613*A*.3.1.

S_1 = The mapped spectral accelerations for a 1-second period as determined in Section 1613*A*.3.1.

3. *With the car or counterweight located in the most adverse position, the stress in the rail shall not exceed the limitations specified in these regulations, nor shall the deflection of the rail relative to its supports exceed the deflection listed below:*

RAIL SIZE (weight per foot of length, pounds)	WIDTH OF MACHINED SURFACE (inches)	ALLOWABLE RAIL DEFLECTION (inches)
8	$1^{1}/_{4}$	0.20
11	$1^{1}/_{2}$	0.30
12	$1^{3}/_{4}$	0.40
15	$1^{31}/_{32}$	0.50
$18^{1}/_{2}$	$1^{31}/_{32}$	0.50
$22^{1}/_{2}$	2	0.50
30	$2^{1}/_{4}$	0.50

For SI: 1 inch = 25 mm, 1 foot = 305 mm, 1 pound = 0.454 kg.

Note: *Deflection limitations are given to maintain a consistent factor of safety against disengagement of retainer plates from the guide rails during an earthquake.*

4. *Where guide rails are continuous over supports and rail joints are within 2 feet (610 mm) of their supporting brackets, a simple span may be assumed.*
5. *The use of spreader brackets is allowed.*
6. *Cab stabilizers and counterweight frames shall be designed to withstand computed lateral load with a minimum horizontal acceleration of 0.5g.*

1616A.1.29 ASCE 7, Section 16.1.4. *Remove ASCE 7, Sections 16.1.4.1 and 16.1.4.2, and modify Section 16.1.4, by the following:*

Maximum scaled base shears used to determine forces and drifts shall not be less than the base shear calculated using the equivalent lateral force procedure of Section 12.8.

1616A.1.30 ASCE 7, Section 16.2.2. *Modify ASCE 7, Section 16.2.2, by adding the following:*

Requirements of this section shall be deemed to be satisfied for new buildings, using acceptance criteria, in Section 16.2.4.2, by the nonlinear modeling parameters in ASCE 41.

1616A.1.31 ASCE 7, Section 16.2.3. *Modify ASCE 7, Section 16.2.3, by adding the following:*

Requirements of this section shall be deemed to be satisfied by using load combinations in Sections 12.4.2.3 and 12.4.3.2 with 25 percent of the required live loads.

1616A.1.32 ASCE 7, Section 16.2.4. *Modify ASCE 7, Section 16.2.4, by the following:*

a) Where site is located within 3.1 miles (5 km) of an active fault at least seven ground motions shall be analyzed and response parameters shall be based on larger of the average of the maximum response with ground motions applied as follows:

1. *Each of the ground motions shall have their maximum component at the fundamental period aligned in one direction.*
2. *Each of the ground motion's maximum component shall be rotated orthogonal to the previous analysis direction.*

b) Where site is located more than 3.1 miles (5 km) from an active fault at least 10 ground motions shall be analyzed. The ground motions shall be applied such that one-half shall have their maximum component aligned in one direction and the other half aligned in the orthogonal direction. The average of the maximum response of all the analyses shall be used for design.

1616A.1.33 [OSHPD 1 & 4] ASCE 7, Section 16.2.4.1. *Replace ASCE 7 exception to Section 16.2.3 by the following:*

Where this standard requires the consideration of the load combinations with overstrength factor of Section 12.4.3.2, average demand from MCE analysis obtained from suite of analysis in accordance with Section 16.2.4 shall be used with Immediate Occupancy (IO) acceptance criteria in Section 16.2.4.2.

1616A.1.34 ASCE 7, Section 16.2.4.2 [OSHPD 1 & 4] *Modify ASCE 7, Section 16.2.4.2, by the following:*

Acceptance criteria for elements subjected to deformation beyond their linear range of response shall be based on ASCE 41 for Immediate Occupancy (IO) at Design Earthquake (DE) and Life Safety (LS) at Maximum Considered Earthquake (MCE_R).

1616A.1.35 ASCE 7, Section 17.2.4.7. *Modify ASCE 7, Section 17.2.4.7, by adding the following:*

The effects of uplift shall be explicitly accounted for in the testing of the isolator units.

1616A.1.36 ASCE 7, Section 17.4. *Modify ASCE 7, Section 17.4.2, by adding the following:*

> ***17.4.2.3 Linear procedures.*** *Linear procedures shall not be used in Seismic Design Category E & F structures.*

1616A.1.37 ASCE 7, Section 17.6 *Modify ASCE 7, Section 17.6, by the following:*

> ***17.6.1.1 Minimum seismic force.*** *For the response spectrum and linear response history procedures, V_b and V_s shall not be taken less than those calculated in accordance with Equations 17.5-7 and 17.5-8.*

1616A.1.38 ASCE 7, Section 18.3.1. *Modify ASCE 7, Section 18.3.1, by replacing the third paragraph with the following:*

If the calculated force in an element of the seismic force resisting system does not exceed 1.5 times its nominal strength for the Risk-Targeted Maximum Considered Earthquake (MCE_R) nor its nominal strength for the design earthquake (DE), the element is permitted to be modeled as linear. For this section, the MCE_R and DE response shall be based on largest response due to a sin-

gle ground motion and not the average response of suite of ground motions.

1616A.1.39 Post-earthquake structural verification. [OSHPD 1 & 4] *Modify ASCE 7 by the following:*

Scope: *For buildings with welded steel moment frames constructed under a permit issued prior to October 25, 1994 post-earthquake verification shall be in accordance with this section.*

Verification: *After every seismic event that generates ground motions specified in the California Administrative Code, Chapter 6, Section 4.2.0.1 or the damage indicators specified in the California Administrative Code, Chapter 6, Section 4.2.0.2 at a welded steel moment frame building constructed under a permit issued prior to October 25, 1994, the owner shall retain a structural engineer to perform detailed joint evaluations required to meet the following requirements:*

1. *A detailed joint evaluation program shall be submitted to the enforcement agency for approval prepared in accordance with the requirements of the California Administrative Code, Chapter 6, Section 4.2.0.3.*
2. *Upon approval of the joint evaluation program required by Item 1 above for the joint inspections, a project to perform the joint inspections, detailed in the program, shall be submitted and a building permit shall be obtained by the owner no later than 6 months from the date of occurrence of the seismic event.*

    Exception: *Where the ground motions at the building site are less than 0.4g, the permit shall be obtained no later than 12 months from the date of occurrence of the seismic event.*

3. *A detailed joint evaluation report shall be submitted to the enforcement agency no later than 6 months of obtaining the building permit. The report shall document the findings from the inspections of the joints and include conclusions on the adequacy of the structural system. Where unsafe conditions are discovered, the provisions of Section 116 shall apply.*

Where the detailed joint evaluation report is not submitted within the timeframes specified above, the building shall not be issued a building permit for any projects except for those for seismic compliance, maintenance and repair until the detailed joint evaluation work is complete.

1616A.1.40 Operational nonstructural performance level requirements. [OSHPD 1 & 4] *New general acute care hospitals and new building(s) required for general acute care services shall satisfy Operational Nonstructural Performance Level (NPC-5) requirements.*

Exception: *A new building which is required for general acute care services that is added to an existing general acute care hospital and which has a building area of 4,000 square feet (371 m^2) or less, need not satisfy the NPC-5 requirements until the deadline specified in California Administrative Code (Part 1, Title 24 CCR), Chapter 6.*

Hospitals and buildings designed and constructed to the provisions of this code for new construction shall be deemed to satisfy Operational Nonstructural Performance Level (NPC-5) requirements when:

1. *The facility has on-site supplies of water and holding tanks for sewage and liquid waste, sufficient to support 72 hours of emergency operations for the hospital or building, which are integrated into the building plumbing systems in accordance with the California Plumbing Code.*
2. *An on-site emergency system as defined in the California Electrical Code is incorporated into the building electrical system for critical care areas. Additionally, the system shall provide for radiological service and an onsite fuel supply for 72 hours of acute care operation.*

Emergency and standby generators shall not be located below the higher of the Design Flood Elevation (DFE) or Base Flood Elevation (BFE) plus two feet (BFE + 2 ft.) or 500 year flood elevation, whichever is higher, and shall be located at an elevation close to grade for easy accessibility from outside for maintenance.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 17 – SPECIAL INSPECTIONS AND TESTS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter																					
Adopt entire chapter as amended (amended sections listed below)	**X**			**X**	**X**						**X**										
Adopt only those sections that are listed below																					
Chapter / Section																					
1703.4											X										
1704.2, *Exception 5*				X	X						X										
1704.2.3	X																				
1705.5.3											X										
1705.13.3.1											X										
1707.1	X			X	X																

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 17

SPECIAL INSPECTIONS AND TESTS

User note: Code change proposals to sections preceded by the designation [BF] will be considered by the IBC — Fire Safety Code Development Committee during the 2015 (Group A) Code Development Cycle. Sections preceded by the designation [F] will be considered by the International Fire Code Development Committee during the 2016 (Group B) Code Development Cycle. All other code change proposals will be considered by the IBC — Structural Code Development Committee during the Group B cycle. See explanation on page ix.

SECTION 1701
GENERAL

1701.1 Scope. The provisions of this chapter shall govern the quality, workmanship and requirements for materials covered. Materials of construction and tests shall conform to the applicable standards listed in this code.

1701.2 New materials. New building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this chapter and in the approved rules to determine character, quality and limitations of use.

SECTION 1702
DEFINITIONS

1702.1 Definitions. The following terms are defined in Chapter 2:

APPROVED AGENCY.

APPROVED FABRICATOR.

CERTIFICATE OF COMPLIANCE.

DESIGNATED SEISMIC SYSTEM.

FABRICATED ITEM.

INTUMESCENT FIRE-RESISTANT COATINGS.

MAIN WINDFORCE-RESISTING SYSTEM.

MASTIC FIRE-RESISTANT COATINGS.

SPECIAL INSPECTION.

- **Continuous special inspection.**
- **Periodic special inspection.**

SPECIAL INSPECTOR.

SPRAYED FIRE-RESISTANT MATERIALS.

STRUCTURAL OBSERVATION.

SECTION 1703
APPROVALS

1703.1 Approved agency. An approved agency shall provide all information as necessary for the building official to determine that the agency meets the applicable requirements specified in Sections 1703.1.1 through 1703.1.3.

1703.1.1 Independence. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose to the building official and the registered design professional in responsible charge possible conflicts of intere0st so that objectivity can be confirmed.

1703.1.2 Equipment. An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated.

1703.1.3 Personnel. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and special inspections.

1703.2 Written approval. Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be approved in writing after satisfactory completion of the required tests and submission of required test reports.

1703.3 Record of approval. For any material, appliance, equipment, system or method of construction that has been approved, a record of such approval, including the conditions and limitations of the approval, shall be kept on file in the building official's office and shall be available for public review at appropriate times.

1703.4 Performance. Specific information consisting of test reports conducted by an approved agency in accordance with the appropriate referenced standards, or other such information as necessary, shall be provided for the building official to determine that the product, material or assembly meets the applicable code requirements.

[OSHPD 2] Tests performed by an independent approved testing agency/laboratory having accreditation to the International Standards Organization (ISO) accreditation Standard 17025 or under the responsible charge of a competent approved independent Registered Design Professional shall be deemed to comply with requirements of this section. Test reports for structural tests shall be reviewed and accepted by an independent California licensed structural engineer.

1703.4.1 Research and investigation. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the building official shall approve the use of the product, material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the owner or the owner's authorized agent.

1703.4.2 Research reports. Supporting data, where necessary to assist in the approval of products, materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

1703.5 Labeling. Products, materials or assemblies required to be labeled shall be labeled in accordance with the procedures set forth in Sections 1703.5.1 through 1703.5.4.

1703.5.1 Testing. An approved agency shall test a representative sample of the product, material or assembly being labeled to the relevant standard or standards. The approved agency shall maintain a record of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

1703.5.2 Inspection and identification. The approved agency shall periodically perform an inspection, which shall be in-plant if necessary, of the product or material that is to be labeled. The inspection shall verify that the labeled product, material or assembly is representative of the product, material or assembly tested.

1703.5.3 Label information. The label shall contain the manufacturer's identification, model number, serial number or definitive information describing the performance characteristics of the product, material or assembly and the approved agency's identification.

1703.5.4 Method of labeling. Information required to be permanently identified on the product, material or assembly shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

1703.6 Evaluation and follow-up inspection services. Where structural components or other items regulated by this code are not visible for inspection after completion of a prefabricated assembly, the owner or the owner's authorized agent shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the building official to determine conformance to this code. Such a report shall be approved by the building official.

1703.6.1 Follow-up inspection. The owner or the owner's authorized agent shall provide for special inspections of fabricated items in accordance with Section 1704.2.5.

1703.6.2 Test and inspection records. Copies of necessary test and special inspection records shall be filed with the building official.

SECTION 1704
SPECIAL INSPECTIONS AND TESTS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATION

1704.1 General. Special inspections and tests, statements of special inspections, responsibilities of contractors, submittals to the building official and structural observations shall meet the applicable requirements of this section.

1704.2 Special inspections and tests. Where application is made to the building official for construction as specified in Sections 105 *or 1.8.4, as applicable,* the owner or the owner's authorized agent, other than the contractor, shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705 and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections by the building official that are identified in Section 110.

[OSHPD 2] An inspection agency having accreditation to the International Standards Organization (ISO) accreditation Standard 17020 shall be deemed to comply with the requirements for an approved inspection agency.

Exceptions:

1. Special inspections and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as approved by the building official.
2. Unless otherwise required by the building official, special inspections and tests are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.
3. Special inspections and tests are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308. *[OSHPD 2] Not permitted by OSHPD.*
4. The contractor is permitted to employ the approved agencies where the contractor is also the owner.
5. ***[HCD 1]*** *The provisions of Health and Safety Code Division 13, Part 6 and the California Code of Regulations, Title 25, Division 1, Chapter 3, commencing with Section 3000, shall apply to the construction and inspection of factory-built housing as defined in Health and Safety Code Section 19971.*

1704.2.1 Special inspector qualifications. Prior to the start of the construction, the approved agencies shall provide written documentation to the building official demonstrating the competence and relevant experience or training of the special inspectors who will perform the special inspections and tests during construction. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of special inspection or testing activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code.

The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as special inspectors for the work designed by them, provided they qualify as special inspectors.

1704.2.2 Access for special inspection. The construction or work for which special inspection or testing is required shall remain accessible and exposed for special inspection or testing purposes until completion of the required special inspections or tests.

1704.2.3 Statement of special inspections. The applicant shall submit a statement of special inspections in accordance with Section 107.1, *Chapter 1, Division II,* as a condition for permit issuance. This statement shall be in accordance with Section 1704.3.

Exception: A statement of special inspections is not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.

1704.2.4 Report requirement. Approved agencies shall keep records of special inspections and tests. The approved agency shall submit reports of special inspections and tests to the building official and to the registered design professional in responsible charge. Reports shall indicate that work inspected or tested was or was not completed in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted at a point in time agreed upon prior to the start of work by the owner or the owner's authorized agent to the building official.

1704.2.5 Special inspection of fabricated items. Where fabrication of structural, load-bearing or lateral load-resisting members or assemblies is being conducted on the premises of a fabricator's shop, special inspections of the fabricated items shall be performed during fabrication.

Exceptions:

1. Special inspections during fabrication are not required where the fabricator maintains approved detailed fabrication and quality control procedures that provide a basis for control of the workmanship and the fabricator's ability to conform to approved construction documents and this code. Approval shall be based upon review of fabrication and quality control procedures and periodic inspection of fabrication practices by the building official.
2. Special inspections are not required where the fabricator is registered and approved in accordance with Section 1704.2.5.1.

1704.2.5.1 Fabricator approval. Special inspections during fabrication are not required where the work is done on the premises of a fabricator registered and approved to perform such work without special inspection. Approval shall be based upon review of the fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved agency. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the owner or the owner's authorized agent for submittal to the building official as specified in Section

1704.5 stating that the work was performed in accordance with the approved construction documents.

1704.3 Statement of special inspections. Where special inspections or tests are required by Section 1705, the registered design professional in responsible charge shall prepare a statement of special inspections in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3.

Exception: The statement of special inspections is permitted to be prepared by a qualified person approved by the building official for construction not designed by a registered design professional.

1704.3.1 Content of statement of special inspections. The statement of special inspections shall identify the following:

1. The materials, systems, components and work required to have special inspections or tests by the building official or by the registered design professional responsible for each portion of the work.
2. The type and extent of each special inspection.
3. The type and extent of each test.
4. Additional requirements for special inspections or tests for seismic or wind resistance as specified in Sections 1705.11, 1705.12 and 1705.13.
5. For each type of special inspection, identification as to whether it will be continuous special inspection, periodic special inspection or performed in accordance with the notation used in the referenced standard where the inspections are defined.

1704.3.2 Seismic requirements in the statement of special inspections. Where Section 1705.12 or 1705.13 specifies special inspections or tests for seismic resistance, the statement of special inspections shall identify the designated seismic systems and seismic force-resisting systems that are subject to the special inspections or tests.

1704.3.3 Wind requirements in the statement of special inspections. Where Section 1705.11 specifies special inspection for wind resistance, the statement of special inspections shall identify the main windforce-resisting systems and wind-resisting components that are subject to special inspections.

1704.4 Contractor responsibility. Each contractor responsible for the construction of a main wind- or seismic force-resisting system, designated seismic system or a wind- or seismic force-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the building official and the owner or the owner's authorized agent prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of special inspections.

1704.5 Submittals to the building official. In addition to the submittal of reports of special inspections and tests in accordance with Section 1704.2.4, reports and certificates shall be submitted by the owner or the owner's authorized agent to the building official for each of the following:

1. Certificates of compliance for the fabrication of structural, load-bearing or lateral load-resisting members or assemblies on the premises of a registered and approved fabricator in accordance with Section 1704.2.5.1.
2. Certificates of compliance for the seismic qualification of nonstructural components, supports and attachments in accordance with Section 1705.13.2.
3. Certificates of compliance for designated seismic systems in accordance with Section 1705.13.3.
4. Reports of preconstruction tests for shotcrete in accordance with Section 1908.5.
5. Certificates of compliance for open web steel joists and joist girders in accordance with Section 2207.5.
6. Reports of material properties verifying compliance with the requirements of AWS D1.4 for weldability as specified in Section 26.5.4 of ACI 318 for reinforcing bars in concrete complying with a standard other than ASTM A706 that are to be welded; and
7. Reports of mill tests in accordance with Section 20.2.2.5 of ACI 318 for reinforcing bars complying with ASTM A615 and used to resist earthquake-induced flexural or axial forces in the special moment frames, special structural walls or coupling beams connecting special structural walls of seismic force-resisting systems in structures assigned to Seismic Design Category B, C, D, E or F.

1704.6 Structural observations. Where required by the provisions of Section 1704.6.1 or 1704.6.2, the owner or the owner's authorized agent shall employ a registered design professional to perform structural observations. Structural observation does not include or waive the responsibility for the inspections in Section 110 or the special inspections in Section 1705 or other sections of this code.

Prior to the commencement of observations, the structural observer shall submit to the building official a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the building official a written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.

1704.6.1 Structural observations for seismic resistance. Structural observations shall be provided for those structures assigned to Seismic Design Category D, E or F where one or more of the following conditions exist:

1. The structure is classified as Risk Category III or IV.
2. The height of the structure is greater than 75 feet (22 860 mm) above the base as defined in ASCE 7.

building official shall approve the use of the product, material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the owner or the owner's authorized agent.

1703*A*.4.2 Research reports. Supporting data, where necessary to assist in the approval of products, materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

1703*A*.5 Labeling. Products, materials or assemblies required to be labeled shall be labeled in accordance with the procedures set forth in Sections 1703*A*.5.1 through 1703*A*.5.4.

1703*A*.5.1 Testing. An approved agency shall test a representative sample of the product, material or assembly being labeled to the relevant standard or standards. The approved agency shall maintain a record of the tests performed. The record shall provide sufficient detail to verify compliance with the test standard.

1703*A*.5.2 Inspection and identification. The approved agency shall periodically perform an inspection, which shall be in-plant if necessary, of the product or material that is to be labeled. The inspection shall verify that the labeled product, material or assembly is representative of the product, material or assembly tested.

1703*A*.5.3 Label information. The label shall contain the manufacturer's identification, model number, serial number or definitive information describing the performance characteristics of the product, material or assembly and the approved agency's identification.

1703*A*.5.4 Method of labeling. Information required to be permanently identified on the product, material or assembly shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

1703*A*.6 Evaluation and follow-up inspection services. Where structural components or other items regulated by this code are not visible for inspection after completion of a prefabricated assembly, the owner or the owner's authorized agent shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the building official to determine conformance to this code. Such a report shall be approved by the building official.

1703*A*.6.1 Follow-up inspection. The owner or the owner's authorized agent shall provide for special inspections of fabricated items in accordance with Section 1704*A*.2.5.

1703*A*.6.2 Test and inspection records. Copies of necessary test and special inspection records shall be filed with the building official.

SECTION 1704*A*
SPECIAL INSPECTIONS AND TESTS, CONTRACTOR RESPONSIBILITY AND STRUCTURAL OBSERVATION

1704*A*.1 General. Special inspections and tests, statements of special inspections, responsibilities of contractors, submittals to the building official and structural observations shall meet the applicable requirements of this section.

1704*A*.2 Special inspections and tests. Where application is made to the building official for construction as specified in Section 105, the owner shall employ one or more approved agencies to provide special inspections and tests during construction on the types of work specified in Section 1705*A* and identify the approved agencies to the building official. These special inspections and tests are in addition to the inspections by the building official that are identified in Section 110.

[OSHPD 1 & 4] An inspection agency having accreditation to the International Standards Organization (ISO) accreditation Standard 17020 shall be deemed to comply with the requirements for an approved inspection agency.

The inspectors shall act under the direction of the architect or structural engineer or both, and be responsible to the Owner. Where the California Administrative Code (CAC) Section 7-115 (a) 2 permits construction documents to be prepared under the responsible charge of a mechanical, electrical or civil engineer, inspectors shall be permitted to work under the direction of engineer in appropriate branch as permitted therein.

Exceptions:

1. Special inspections and tests are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as approved by the building official.
2. *[DSA-SS, DSA-SS/CC] Reference to Section 105 and Section 110 shall be to the California Administrative Code instead.*

1704*A*.2.1 Special inspector qualifications. Prior to the start of the construction, the approved agencies shall provide written documentation to the building official demonstrating the competence and relevant experience or training of the special inspectors who will perform the special inspections and tests during construction. Experience or training shall be considered relevant where the documented experience or training is related in complexity to the same type of special inspection or testing activities for projects of similar complexity and material qualities. These qualifications are in addition to qualifications specified in other sections of this code.

The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as special inspectors for the work designed by them, provided they qualify as special inspectors.

1704*A*.2.2 Access for special inspection. The construction or work for which special inspection or testing is required shall remain accessible and exposed for special inspection or testing purposes until completion of the required special inspections or tests.

1704*A*.2.3 Statement of special inspections. The applicant shall submit a statement of special inspections *prepared by the registered design professional in general responsible charge* in accordance with Section 107.1 as a condition for *construction documents review*. This statement shall be in accordance with Section 1704*A*.3.

[DSA-SS, DSA-SS/CC] Reference to Section 107.1 shall be to the California Administrative Code instead.

1704*A*.2.4 Report requirement. *The inspector(s) of record and* approved agencies shall keep records of inspections. The *inspector of record and* approved agency shall furnish inspection reports to the building official, and to the registered design professional in responsible charge *as required by the California Administrative Code.* Reports shall indicate that work inspected was or was not completed in conformance to approved construction documents *as required by the California Administrative Code and this code*. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and tests, and correction of any discrepancies noted in the inspections or tests, shall be submitted at a point in time agreed upon prior to the start of work by the owner or the owner's authorized agent to the building official.

1704*A*.2.5 Special inspection of fabricated items. Where fabrication of structural, load-bearing or lateral load-resisting members or assemblies is being conducted on the premises of a fabricator's shop, special inspections of the fabricated items shall be performed during fabrication.

> **Exception:** ***[OSHPD 1 & 4]*** Special inspections during fabrication are not required where the fabricator maintains approved detailed fabrication and quality control procedures that provide a basis for control of the workmanship and the fabricator's ability to conform to approved construction documents and this code. Approval shall be based upon review of fabrication and quality control procedures and periodic inspection of fabrication practices by the *special inspector and/or* building official, *as determined by the building official.*

1704*A*.3 Statement of special inspections. Where special inspections or tests are required by Section 1705*A*, the registered design professional in responsible charge shall prepare a statement of special inspections in accordance with Section 1704*A*.3.1 for submittal by the applicant in accordance with Section 1704*A*.2.3.

> **Exception:** The statement of special inspections is permitted to be prepared by a qualified person approved by the building official for construction not designed by a registered design professional.

1704*A*.3.1 Content of statement of special inspections. The statement of special inspections shall identify the following:

1. The materials, systems, components and work required to have special inspections or tests by the building official or by the registered design professional responsible for each portion of the work.
2. The type and extent of each special inspection.
3. The type and extent of each test.
4. Additional requirements for special inspections or tests for seismic or wind resistance as specified in Sections 1705*A*.11, 1705*A*.12 and 1705*A*.13.
5. For each type of special inspection, identification as to whether it will be continuous special inspection, periodic special inspection or performed in accordance with the notation used in the referenced standard where the inspections are defined.

1704*A*.3.2 Seismic requirements in the statement of special inspections. Where Section 1705*A*.12 or 1705*A*.13 specifies special inspections or tests for seismic resistance, the statement of special inspections shall identify the *equipment/components that require special seismic certification* and seismic force-resisting systems that are subject to the special inspections or tests.

1704*A*.3.3 Wind requirements in the statement of special inspections. Where Section 1705*A*.11 specifies special inspection for wind resistance, the statement of special inspections shall identify the main windforce-resisting systems and wind-resisting components that are subject to special inspections.

1704*A*.4 Contractor responsibility. Each contractor responsible for the construction of a main wind- or seismic force-resisting system, *installation of equipment/components requiring special seismic certification* or a wind- or seismic force-resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the building official and the owner or the owner's authorized agent prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of special inspections.

1704*A*.5 Submittals to the building official. In addition to the submittal of reports of special inspections and tests in accordance with Section 1704*A*.2.4, reports and certificates shall be submitted by the owner or the owner's authorized agent to the building official for each of the following:

1. ***[OSHPD 1 & 4]*** Certificates of compliance for the fabrication of structural, load-bearing or lateral load-resisting members or assemblies on the premises of *an* approved fabricator in accordance with Section *1704A.2.5*.
2. Certificates of compliance for the *manufacturer's certification* of nonstructural components, supports and attachments in accordance with Section 1705*A*.13.2.

3. Certificates of compliance for *equipment/components requiring special seismic certification* in accordance with Section 1705*A*.13.3.
4. Reports of preconstruction tests for shotcrete in accordance with Section 1908.5.
5. Certificates of compliance for open web steel joists and joist girders in accordance with Section 2207.5.
6. Reports of material properties verifying compliance with the requirements of AWS D1.4 for weldability as specified in Section 26.5.4 of ACI 318 for reinforcing bars in concrete complying with a standard other than ASTM A706 that are to be welded; and
7. Reports of mill tests in accordance with Section 20.2.2.5 of ACI 318 for reinforcing bars complying with ASTM A615 and used to resist earthquake-induced flexural or axial forces in the special moment frames, special structural walls or coupling beams connecting special structural walls of seismic force-resisting systems in structures assigned to Seismic Design Category B, C, D, E or F.

1704*A*.6 Structural observations. The owner shall employ a registered design professional to perform structural observations. Structural observation does not include or waive the responsibility for the inspections in Section 110 or the special inspections in Section 1705*A* or other sections of this code.

Prior to the commencement of observations, the structural observer shall submit to the building official a written statement identifying the frequency and extent of structural observations.

At the conclusion of the work included in the permit, the structural observer shall submit to the building official a written statement that the site visits have been made and identify any reported deficiencies that, to the best of the structural observer's knowledge, have not been resolved.

[DSA-SS, DSA-SS/CC] Reference to Section 110 shall be to the California Administrative Code instead.

SECTION 1705*A*
REQUIRED SPECIAL INSPECTIONS AND TESTS

1705*A*.1 General. Special inspections and tests of elements and nonstructural components of buildings and structures shall meet the applicable requirements of this section.

1705*A*.1.1 Special cases. Special inspections and tests shall be required for proposed work that is, in the opinion of the building official, unusual in its nature, such as, but not limited to, the following examples:

1. Construction materials and systems that are alternatives to materials and systems prescribed by this code.
2. Unusual design applications of materials described in this code.
3. Materials and systems required to be installed in accordance with additional manufacturer's instructions that prescribe requirements not contained in this code or in standards referenced by this code.

1705*A*.2 Steel construction. The special inspections and nondestructive testing of steel construction in buildings, structures, and portions thereof shall be in accordance with this section.

Exception: Special inspections of the steel fabrication process shall not be required where the fabricator does not perform any welding, thermal cutting or heating operation of any kind as part of the fabrication process. In such cases, the fabricator shall be required to submit a detailed procedure for material control that demonstrates the fabricator's ability to maintain suitable records and procedures such that, at any time during the fabrication process, the material specification and grade for the main stress-carrying elements are capable of being determined. Mill test reports shall be identifiable to the main stress-carrying elements when required by the approved construction documents.

1705*A*.2.1 Structural steel. Special inspections and nondestructive testing of structural steel elements in buildings, structures and portions thereof shall be in accordance with the quality assurance requirements *of this section, Chapter 22A and quality control requirements of AISC 360, AISC 341 and AISC 358.*

Exception: Special inspection of railing systems composed of structural steel elements shall be limited to welding inspection of welds at the base of cantilevered rail posts.

AISC 360, Chapter N and AISC 341, Chapter J are adopted, except as noted below:

The following provisions of AISC 360, Chapter N are not adopted:

1. N4., Item 2. (Quality Assurance Inspector Qualifications)
2. N5., Item 2. (Quality Assurance)
*3. **[DSA-SS, DSA-SS/CC]***
N5., Item 3. (Coordinated Inspection)
*4. **[DSA-SS, DSA-SS/CC]***
N5., Item 4. (Inspection of Welding)
*5. **[DSA-SS, DSA-SS/CC]***
N7 (Approved Fabricators and Erectors)
*6. **[DSA-SS, DSA-SS/CC]***
N8 (Nonconforming Material and Workmanship)

In addition to the quality assurance inspection requirements contained in AISC 360, Section N5 (Minimum Requirements for Inspection of Structural Steel Buildings), the requirements of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 360, Section N6 (Minimum Requirements for Inspection of Composite Construction), the require-

ments of Table 1705A.2.1 of the California Building Code shall apply.

In addition to the quality assurance requirements contained in AISC 341, Chapter J, Section J5 (Inspection Tasks), the requirements of Section 1704A.3 and Table 1705A.2.1 of the California Building Code shall apply.

1705*A*.2.2 Cold-formed steel deck. Special inspections for cold-formed steel floor and roof deck shall be in accordance with the quality assurance inspection requirements of SDI QA/QC.

Deck weld special inspection shall also satisfy requirements in Table 1705A.2.1 and Section 1705A.2.5.

1705*A*.2.3 Open-web steel joists and joist girders. Special inspections of open-web steel joists and joist girders in buildings, structures and portions thereof shall be in accordance with Table 1705*A*.2.3.

1705A.2.3.1 Steel joist and joist girder inspection. *Special inspection is required during the manufacture and welding of steel joists or joist girders. The approved agency shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. The approved agency shall place a distinguishing mark, and/or tag with this distinguishing mark, on each inspected joist or joist girder. This mark or tag shall remain on the joist or joist girder throughout the job site receiving and erection process.*

1705*A*.2.4 Cold-formed steel trusses spanning 60 feet or greater. Where a cold-formed steel truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

1705A.2.4.1 Light-framed steel truss inspection. *The manufacture of cold-formed light framed steel trusses shall be continuously inspected by an approved agency. The approved agency shall verify conformance of materials and manufacture with approved plans and specifications. The approved agency shall place a distinguishing mark, and/or tag with this distinguishing mark, on each inspected truss. This mark or tag shall remain on the truss throughout the job site receiving and erection process.*

1705A.2.5 Inspection of structural welding. *Inspection of all shop and field welding operations shall be made by a qualified welding inspector approved by the enforcement agency. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provisions of the AWS QC1.*

Exception: [OSHPD 1 & 4] *Inspection and nondestructive testing personnel meeting the requirements of AISC 341 Section J4 (in addition to AISC 360 Section N4) shall be permitted to perform quality control and quality assurance inspections at the premises of an approved fabricator's shop.*

The welding inspector shall make a systematic daily record of all welds. In addition to other required records, this record shall include:

1. *Identification marks of welders.*
2. *List of defective welds.*
3. *Manner of correction of defects.*

The welding inspector shall check the material, details of construction and procedure, as well as workmanship of the welds. The inspector shall verify that the installation of end-welded stud shear connectors is in accordance with the requirements of AWS D1.1 and the approved plans and specifications. The approved agency shall furnish the architect, structural engineer, and the enforcement agency with a verified report that the welding has been done in conformance with AWS D1.1, D1.3, D1.8, and the approved construction documents.

1705*A*.3 Concrete construction. Special inspections and tests of concrete construction shall be performed in accordance with this section and Table 1705*A*.3.

Exception: Special inspections and tests shall not be required for concrete patios, driveways and sidewalks, on grade.

1705A.3.1 Welding of reinforcing bars. Special inspections of welding and qualifications of special inspectors for reinforcing bars shall be in accordance with the requirements of AWS D1.4 for special inspection and of AWS D1.4 for special inspector qualification.

1705A.3.2 Material tests. In the absence of sufficient data or documentation providing evidence of conformance to quality standards for materials in Chapters 19 and 20 of ACI 318, the building official shall require testing of materials in accordance with the appropriate standards and criteria for the material in Chapters 19 and 20 of ACI 318.

1705A.3.3 Batch plant inspection. *Except as provided under this section, the quality and quantity of materials used in transit-mixed concrete and in batched aggregates shall be continuously inspected by an approved agency at the location where materials are measured.*

1705A.3.3.1 Waiver of continuous batch plant inspection. *Continuous batch plant inspection may be waived by the registered design professional, subject to approval by the enforcement agency under either of the following conditions:*

1. *The concrete plant complies fully with the requirements of ASTM C94, Sections 9 and 10, and has a current certificate from the National Ready Mixed Concrete Association or another agency acceptable to the enforcement agency. The certification shall indicate that the plant has automatic batching and recording capabilities.*
2. *For single-story light-framed construction (without basement or retaining walls higher than 6' in height*

TABLE 1705A.3
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CONCRETE CONSTRUCTION

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION	REFERENCED STANDARD[a]	IBC REFERENCE
1. Inspect reinforcement, including prestressing tendons, and verify placement.	—	X	ACI 318 Ch. 20, 25.2, 25.3, 26.5.1-26.5.3	1908.4
2. Reinforcing bar welding:			AWS D1.4 ACI 318: 26.5.4	—
a. Verify weldability of reinforcing bars other than ASTM A706;	—	X		
b. Inspect single-pass fillet welds, maximum $^5/_{16}$″; and		X		
c. Inspect all other welds.	X			
3. Inspect anchors cast in concrete.	—	X	ACI 318: 17.8.2	—
4. Inspect anchors post-installed in hardened concrete members.[b, c]				—
a. Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	X		ACI 318: 17.8.2.4	
b. Mechanical anchors and adhesive anchors not defined in 4.a.		X	ACI 318: 17.8.2	
5. Verify use of required design mix.	—	X	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6. Prior to concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	X	—	ASTM C172 ASTM C31 ACI 318: 26.4.5, 26.12	1908.10
7. Inspect concrete and shotcrete placement for proper application techniques.	X	—	ACI 318: 26.4.5	1908.6, 1908.7, 1908.8
8. Verify maintenance of specified curing temperature and techniques.	—	X	ACI 318: 26.4.7-26.4.9	1908.9
9. Inspect prestressed concrete for:				—
a. Application of prestressing forces; and	X	—	ACI 318: 26.9.2.1	
b. Grouting of bonded prestressing tendons.	X	—	ACI 318: 26.9.2.3	
10. Inspect erection of precast concrete members.	—	X	ACI 318: Ch. 26.8	—
11. Verify in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beams and structural slabs.	—	X	ACI 318: 26.10.2	—
12. Inspect formwork for shape, location and dimensions of the concrete member being formed.	—	X	ACI 318: 26.10.1(b)	—

For SI: 1 inch = 25.4 mm.

a. Where applicable, see also Section 1705.12, Special inspections for seismic resistance.

b. Specific requirements for special inspection shall be included in the research report for the anchor issued by an approved source in accordance with 17.8.2 in ACI 318, or other qualification procedures. Where specific requirements are not provided, special inspection requirements shall be specified by the registered design professional and shall be approved by the building official prior to the commencement of the work.

c. Installation of all adhesive anchors in horizontal and upwardly inclined positions shall be performed by an ACI/CRSI Certified Adhesive Anchor Installer, except where the factored design tension on the anchors is less than 100 lbs and those anchors are clearly noted on the approved construction documents or where the anchors are shear dowels across cold joints in slabs on grade where the slab is not part of the lateral force-resisting system.

1705*A*.4 Masonry construction. Special inspections and tests of masonry construction shall be performed in accordance with the quality assurance program requirements of TMS 402/ACI 530/ASCE 5*, as set forth in Table 3.1.3 Level C requirements* and TMS 602/ACI 530.1/ASCE 6. *Special inspection and testing of post-installed anchors in masonry shall be required in accordance with requirements for concrete in Chapters 17A and 19A.*

1705*A*.4.1 Glass unit masonry and masonry veneer in Risk *Categories II, III or* IV. Special inspections and tests for glass unit masonry or masonry veneer designed in accordance with Section 2110*A* or Chapter 14, respectively, where they are part of a structure classified as *Risk Categories II, III or* IV shall be performed in accordance with TMS 402/ACI 530/ASCE 5, Level B Quality Assurance.

1705*A*.4.2 Vertical masonry foundation elements. Special inspections and tests of vertical masonry foundation elements shall be performed in accordance with Section 1705*A*.4.

1705*A*.5 Wood construction. Special inspections of prefabricated wood structural elements and assemblies shall be in accordance with Section 1704*A*.2.5 *except as modified in this section.* Special inspections of site-built assemblies shall be in accordance with this section.

1705*A*.5.1 High-load diaphragms. High-load diaphragms designed in accordance with Section 2306.2 shall be installed with special inspections as indicated in Section 1704*A*.2. The special inspector shall inspect the wood structural panel sheathing to ascertain whether it is of the grade and thickness shown on the approved construction documents. Additionally, the special inspector must verify the nominal size of framing members at adjoining panel edges, the nail or staple diameter and length, the number of fastener lines and that the spacing between fasteners in each line and at edge margins agrees with the approved construction documents.

1705*A*.5.2 Metal-plate-connected wood trusses spanning 60 feet or greater. Where a truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.

1705A.5.3 Wood structural elements and assemblies. *Special inspection of wood structural elements and assemblies is required, as specified in this section, to ensure conformance with approved construction documents, and applicable standards.*

The approved agency shall furnish a verified report to the design professional in general responsible charge of construction observation, the structural engineer, and the enforcement agency, in accordance with the California Administrative Code and this chapter. The verified report shall list all inspected members or trusses, and shall indicate whether or not the inspected members or trusses conform with applicable standards and the approved drawings and specifications. Any nonconforming items shall be indicated on the verified report.

1705A.5.4 Structural glued laminated timber. *Manufacture of all structural glued laminated timber shall be continuously inspected by an approved agency.*

The approved agency shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. Each inspected member shall be stamped by the approved agency with an identification mark.

> ***Exception:*** *Special Inspection is not required for noncustom members of* $5^{1}/_{8}$ *inch maximum width and 18 inch maximum depth, and with a maximum clear span of 32 feet, manufactured and marked in accordance with ANSI/AITC A 190.1 Section 6.1.1 for noncustom members.*

1705A.5.5 Manufactured open web trusses. *The manufacture of open web trusses shall be continuously inspected by an approved agency.*

The approved agency shall verify that proper quality control procedures and tests have been employed for all materials and the manufacturing process, and shall perform visual inspection of the finished product. Each inspected truss shall be stamped with an identification mark by the approved agency.

1705A.5.6 Timber connectors. *The installation of all split ring and shear plate timber connectors, and timber rivets shall be continuously inspected by an approved agency. The approved agency shall furnish the architect, structural engineer and the enforcement agency with a report verifying that the materials, timber connectors and workmanship conform to the approved construction documents.*

1705*A*.6 Soils. Special inspections and tests of existing site soil conditions, fill placement and load-bearing requirements shall be performed in accordance with this section and Table 1705*A*.6. The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance. During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report.

> **Exception:** Where Section 1803 does not require reporting of materials and procedures for fill placement, the special inspector shall verify that the in-place dry density of the compacted fill is not less than 90 percent of the maximum dry density at optimum moisture content determined in accordance with ASTM D1557.

1705A.6.1 Soil fill. *All fills used to support the foundations of any building or structure shall be continuously inspected by the geotechnical engineer or his or her qualified representative. It shall be the responsibility of the geotechnical engineer to verify that fills meet the requirements of the approved construction documents and to coordinate all fill inspection and testing during the construction involving such fills.*

The duties of the geotechnical engineer or his or her qualified representative shall include, but need not be lim-

TABLE 1705*A*.6
REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity.	—	X
2. Verify excavations are extended to proper depth and have reached proper material.	—	X
3. Perform classification and testing of compacted fill materials.	—	X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	X	—
5. Prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.	—	X

ited to, the inspection of cleared areas and benches prepared to receive fill; inspection of the removal of all unsuitable soils and other materials; the approval of soils to be used as fill material; the inspection of placement and compaction of fill materials; the testing of the completed fills; the inspection or review of geotechnical drainage devices, buttress fills or other similar protective measures in accordance with the approved construction documents.

A verified report shall be submitted by the geotechnical engineer as required by the California Administrative Code. The report shall indicate that all tests and inspection required by the approved construction documents were completed and that the tested materials and/or inspected work meet the requirements of the approved construction documents.

1705*A*.7 Driven deep foundations. Special inspections and tests shall be performed during installation of driven deep foundation elements as specified in Table 1705*A*.7. The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance.

1705A.7.1 Driven deep foundations observation. *The installation of driven deep foundations shall be continuously observed by a qualified representative of the geotechnical engineer responsible for that portion of the project.*

The representative of the geotechnical engineer shall make a report of the deep foundation pile-driving operation giving such pertinent data as the physical characteristics of the deep foundation pile-driving equipment, identifying marks for each deep foundation pile, the total depth of embedment for each deep foundation; and when the allowable deep foundation pile loads are determined by a dynamic load formula, the design formula used, and the permanent penetration under the last 10 blows. One copy of the report shall be sent to the enforcement agency.

1705*A*.8 Cast-in-place deep foundations. Special inspections and tests shall be performed during installation of cast-in-place deep foundation elements as specified in Table 1705*A*.8. The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance.

1705*A*.9 Helical pile foundations. Continuous special inspections shall be performed during installation of helical pile foundations. The information recorded shall include installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required by the registered design professional in responsible charge. The approved geotechnical report and the construction documents prepared by the registered design professional shall be used to determine compliance.

TABLE 1705*A*.7
REQUIRED SPECIAL INSPECTIONS AND TESTS OF DRIVEN DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Verify element materials, sizes and lengths comply with the requirements.	X	—
2. Determine capacities of test elements and conduct additional load tests, as required.	X	—
3. Inspect driving operations and maintain complete and accurate records for each element.	X	—
4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element.	X	—
5. For steel elements, perform additional special inspections in accordance with Section 1705*A*.2.	—	—
6. For concrete elements and concrete-filled elements, perform tests and additional special inspections in accordance with Section 1705*A*.3.	—	—
7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge.	—	—

TABLE 1705*A*.8
REQUIRED SPECIAL INSPECTIONS AND TESTS OF CAST-IN-PLACE DEEP FOUNDATION ELEMENTS

TYPE	CONTINUOUS SPECIAL INSPECTION	PERIODIC SPECIAL INSPECTION
1. Inspect drilling operations and maintain complete and accurate records for each element.	X	—
2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes.	X	—
3. For concrete elements, perform tests and additional special inspections in accordance with Section 1705*A*.3.	—	—

1705*A*.10 Fabricated items. Special inspections of fabricated items shall be performed in accordance with Section 1704*A*.2.5.

1705*A*.11 Special inspections for wind resistance. Special inspections for wind resistance specified in Sections 1705*A*.11.1 through 1705*A*.11.3, unless exempted by the exceptions to Section 1704*A*.2, are required for buildings and structures constructed in the following areas:

1. In wind Exposure Category B, where V_{asd} as determined in accordance with Section 1609.3.1 is 120 miles per hour (52.8 m/sec) or greater.
2. In wind Exposure Category C or D, where V_{asd} as determined in accordance with Section 1609.3.1 is 110 mph (49 m/sec) or greater.

1705*A*.11.1 Structural wood. Continuous special inspection is required during field gluing operations of elements of the main windforce-resisting system. Periodic special inspection is required for nailing, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including wood shear walls, wood diaphragms, drag struts, braces and hold-downs.

1705*A*.11.2 Cold-formed steel light-frame construction. Periodic special inspection is required for welding operations of elements of the main windforce-resisting system. Periodic special inspection is required for screw attachment, bolting, anchoring and other fastening of elements of the main windforce-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

1705*A*.11.3 Wind-resisting components. Periodic special inspection is required for fastening of the following systems and components:

1. Roof covering, roof deck and roof framing connections.
2. Exterior wall covering and wall connections to roof and floor diaphragms and framing.

1705*A*.12 Special inspections for seismic resistance. Special inspections for seismic resistance shall be required as specified in Sections 1705*A*.12.1 through 1705*A*.12.9, unless exempted by the exceptions of Section 1704*A*.2.

1705*A*.12.1 Structural steel. Special inspections for seismic resistance shall be in accordance with Section 1705*A*.12.1.1 or 1705*A*.12.1.2, as applicable.

1705*A*.12.1.1 Seismic force-resisting systems. Special inspections of structural steel in the seismic force-resisting systems of buildings and structures assigned to Seismic Design Category D, E or F shall be performed in accordance with the quality assurance requirements of AISC 341 *as modified by Section 1705A.2.1 of this code*.

1705*A*.12.1.2 Structural steel elements. Special inspections of structural steel elements in the seismic force-resisting systems of buildings and structures assigned to Seismic Design Category D, E or F other than those covered in Section 1705*A*.12.1.1, including struts, collectors, chords and foundation elements, shall be performed in accordance with the quality assurance requirements of AISC 341 *as modified by Section 1705A.2.1 of this code*.

1705*A*.12.2 Structural wood. For the seismic force-resisting systems of structures assigned to Seismic Design Category D, E or F:

1. Continuous special inspection shall be required during field gluing operations of elements of the seismic force-resisting system.
2. Periodic special inspection shall be required for nailing, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including wood shear walls, wood diaphragms, drag struts, braces, shear panels and hold-downs.

1705*A*.12.3 Cold-formed steel light-frame construction. For the seismic force-resisting systems of structures assigned to Seismic Design Category D, E or F, periodic special inspection shall be required:

1. For welding operations of elements of the seismic force-resisting system; and
2. For screw attachment, bolting, anchoring and other fastening of elements of the seismic force-resisting system, including shear walls, braces, diaphragms, collectors (drag struts) and hold-downs.

1705*A*.12.4 *Special inspection for special seismic certification*. For structures assigned to Seismic Design Category D, E or F, the special inspector shall examine *equipment and components* requiring *special* seismic *certification* in accordance with *Section 1705A.13.3 or* ASCE 7 Section 13.2.2 and verify that the label, anchorage and mounting conform to the certificate of compliance.

1705*A*.12.5 Architectural components. Periodic special inspection is required for the erection and fastening of exterior cladding, interior and exterior nonbearing walls, *ceilings* and interior and exterior veneer in structures assigned to Seismic Design Category D, E or F.

1705*A*.12.5.1 Access floors. Periodic special inspection is required for the anchorage of access floors in structures assigned to Seismic Design Category D, E or F.

1705*A*.12.6 Plumbing, mechanical and electrical components. Periodic special inspection of plumbing, mechanical and electrical components shall be required for the following:

1. Anchorage of electrical equipment for emergency and standby power systems in structures assigned to Seismic Design Category D, E or F.
2. Anchorage of other electrical equipment in structures assigned to Seismic Design Category D, E or F.
3. Installation and anchorage of piping systems designed to carry hazardous materials and their

enced standards. In the absence of a standard that contains an applicable load test procedure, the test procedure shall be developed by a registered design professional and approved. The test procedure shall simulate loads and conditions of application that the completed structure or portion thereof will be subjected to in normal use.

1708*A*.3 In-situ load tests. In-situ load tests shall be conducted in accordance with Section 1708*A*.3.1 or 1708*A*.3.2 and shall be supervised by a registered design professional. The test shall simulate the applicable loading conditions specified in Chapter 16 as necessary to address the concerns regarding structural stability of the building, structure or portion thereof.

1708*A*.3.1 Load test procedure specified. Where a referenced standard contains an applicable load test procedure and acceptance criteria, the test procedure and acceptance criteria in the standard shall apply. In the absence of specific load factors or acceptance criteria, the load factors and acceptance criteria in Section 1708*A*.3.2 shall apply.

1708*A*.3.2 Load test procedure not specified. In the absence of applicable load test procedures contained within a standard referenced by this code or acceptance criteria for a specific material or method of construction, such existing structure shall be subjected to a test procedure developed by a registered design professional that simulates applicable loading and deformation conditions. For components that are not a part of the seismic force-resisting system, at a minimum the test load shall be equal to the specified factored design loads. For materials such as wood that have strengths that are dependent on load duration, the test load shall be adjusted to account for the difference in load duration of the test compared to the expected duration of the design loads being considered. For statically loaded components, the test load shall be left in place for a period of 24 hours. For components that carry dynamic loads (e.g., machine supports or fall arrest anchors), the load shall be left in place for a period consistent with the component's actual function. The structure shall be considered to have successfully met the test requirements where the following criteria are satisfied:

1. Under the design load, the deflection shall not exceed the limitations specified in Section 1604.3.
2. Within 24 hours after removal of the test load, the structure shall have recovered not less than 75 percent of the maximum deflection.
3. During and immediately after the test, the structure shall not show evidence of failure.

SECTION 1709*A*
PRECONSTRUCTION LOAD TESTS

1709*A*.1 General. Where proposed construction is not capable of being designed by approved engineering analysis, or where proposed construction design method does not comply with the applicable material design standard, the system of construction or the structural unit and the connections shall be subjected to the tests prescribed in Section 1709*A*. The building official shall accept certified reports of such tests conducted by an approved testing agency, provided that such tests meet the requirements of this code and approved procedures.

1709*A*.2 Load test procedures specified. Where specific load test procedures, load factors and acceptance criteria are included in the applicable referenced standards, such test procedures, load factors and acceptance criteria shall apply. In the absence of specific test procedures, load factors or acceptance criteria, the corresponding provisions in Section 1709*A*.3 shall apply.

1709*A*.3 Load test procedures not specified. Where load test procedures are not specified in the applicable referenced standards, the load-bearing and deformation capacity of structural components and assemblies shall be determined on the basis of a test procedure developed by a registered design professional that simulates applicable loading and deformation conditions. For components and assemblies that are not a part of the seismic force-resisting system, the test shall be as specified in Section 1709*A*.3.1. Load tests shall simulate the applicable loading conditions specified in Chapter 16.

1709*A*.3.1 Test procedure. The test assembly shall be subjected to an increasing superimposed load equal to not less than two times the superimposed design load. The test load shall be left in place for a period of 24 hours. The tested assembly shall be considered to have successfully met the test requirements if the assembly recovers not less than 75 percent of the maximum deflection within 24 hours after the removal of the test load. The test assembly shall then be reloaded and subjected to an increasing superimposed load until either structural failure occurs or the superimposed load is equal to two and one-half times the load at which the deflection limitations specified in Section 1709*A*.3.2 were reached, or the load is equal to two and one-half times the superimposed design load. In the case of structural components and assemblies for which deflection limitations are not specified in Section 1709*A*.3.2, the test specimen shall be subjected to an increasing superimposed load until structural failure occurs or the load is equal to two and one-half times the desired superimposed design load. The allowable superimposed design load shall be taken as the lesser of:

1. The load at the deflection limitation given in Section 1709*A*.3.2.
2. The failure load divided by 2.5.
3. The maximum load applied divided by 2.5.

1709*A*.3.2 Deflection. The deflection of structural members under the design load shall not exceed the limitations in Section 1604.3.

1709*A*.4 Wall and partition assemblies. Load-bearing wall and partition assemblies shall sustain the test load both with and without window framing. The test load shall include all design load components. Wall and partition assemblies shall be tested both with and without door and window framing.

1709*A*.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1709*A*.5.1 or 1709*A*.5.2. For the purposes of this section, the required design pressure shall be determined using the allowable stress design load combinations of Section 1605.3.

> **Exception:** Structural wind load design pressures for window units smaller than the size tested in accordance with Section 1709*A*.5.1 or 1709*A*.5.2 shall be permitted to be higher than the design value of the tested unit provided such higher pressures are determined by accepted engineering analysis. All components of the small unit shall be the same as the tested unit. Where such calculated design pressures are used, they shall be validated by an additional test of the window unit having the highest allowable design pressure.

1709*A*.5.1 Exterior windows and doors. Exterior windows and sliding doors shall be tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440. The label shall state the name of the manufacturer, the approved labeling agency and the product designation as specified in AAMA/WDMA/CSA101/I.S.2/A440. Exterior side-hinged doors shall be tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440 or comply with Section 1709.5.2. Products tested and labeled as conforming to AAMA/WDMA/CSA 101/I.S.2/A440 shall not be subject to the requirements of Sections 2403.2 and 2403.3.

1709*A*.5.2 Exterior windows and door assemblies not provided for in Section 1709*A*.5.1. Exterior window and door assemblies shall be tested in accordance with ASTM E330. Structural performance of garage doors and rolling doors shall be determined in accordance with either ASTM E330 or ANSI/DASMA 108, and shall meet the acceptance criteria of ANSI/DASMA 108. Exterior window and door assemblies containing glass shall comply with Section 2403. The design pressure for testing shall be calculated in accordance with Chapter 16. Each assembly shall be tested for 10 seconds at a load equal to 1.5 times the design pressure.

1709*A*.6 Skylights and sloped glazing. Skylights and sloped glazing shall comply with the requirements of Chapter 24.

1709*A*.7 Test specimens. Test specimens and construction shall be representative of the materials, workmanship and details normally used in practice. The properties of the materials used to construct the test assembly shall be determined on the basis of tests on samples taken from the load assembly or on representative samples of the materials used to construct the load test assembly. Required tests shall be conducted or witnessed by an approved agency.

Notation for [DSA-SS]

Authority: Education Code §17310 and 81142, and H&S Code §16022.

Reference: Education Code §§17280 through 17317, and 81130 through 81147, and Health and Safety Code §§16000 through 16023.

Notation for [DSA-SS/CC]

Authority: Education Code §81053.

Reference: Education Code §81052, 81053, and 81130 through 81147.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 18 – SOILS AND FOUNDATIONS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	**X**																				
Adopt entire chapter as amended (amended sections listed below)				**X**	**X**						**X**										
Adopt only those sections that are listed below																					
Chapter / Section																					
1801.2				X																	
1803.1.1– 1803.1.1.5				X																	
1803.2											X										
1803.6											X										
1803.7											X										
1804.4.1				X																	
1805.4.1, *Exception 2*				X																	
1805.4.3																					
1810.3.1.5.1											X										
1810.3.10.4.1											X										
1810.3.10.4	X																				

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 18

SOILS AND FOUNDATIONS

User note: Code change proposals to this chapter will be considered by the IBC – Structural Code Development Committee during the 2016 (Group B) Code Development Cycle. See explanation on page ix.

SECTION 1801
GENERAL

1801.1 Scope. The provisions of this chapter shall apply to building and foundation systems.

1801.2 Design basis. Allowable bearing pressures, allowable stresses and design formulas provided in this chapter shall be used with the allowable stress design load combinations specified in Section 1605.3. The quality and design of materials used structurally in excavations and foundations shall comply with the requirements specified in Chapters 16, 19, 21, 22 and 23 of this code. Excavations and fills shall also comply with Chapter 33.

[HCD 1] For limited-density owner-built rural dwellings, pier foundations, stone masonry footings and foundations, pressure-treated lumber, poles or equivalent foundation materials or designs may be used, provided that the bearing is sufficient for the purpose intended.

SECTION 1802
DEFINITIONS

1802.1 Definitions. The following words and terms are defined in Chapter 2:

DEEP FOUNDATION.

DRILLED SHAFT.

Socketed drilled shaft.

HELICAL PILE.

MICROPILE.

SHALLOW FOUNDATION.

SECTION 1803
GEOTECHNICAL INVESTIGATIONS

1803.1 General. Geotechnical investigations shall be conducted in accordance with Section 1803.2 and reported in accordance with Section 1803.6. Where required by the building official or where geotechnical investigations involve in-situ testing, laboratory testing or engineering calculations, such investigations shall be conducted by a registered design professional.

1803.1.1 General and where required for applications listed in Section 1.8.2.1.1 regulated by the Department of Housing and Community Development. [HCD 1] *Foundation and soils investigations shall be conducted in conformance with Health and Safety Code Sections 17953 through 17957 as summarized below.*

1803.1.1.1 Preliminary soil report. *Each city, county, or city and county shall enact an ordinance which requires a preliminary soil report, prepared by a civil engineer who is registered by the state. The report shall be based upon adequate test borings or excavations, of every subdivision, where a tentative and final map is required pursuant to Section 66426 of the Government Code.*

The preliminary soil report may be waived if the building department of the city, county, or city and county, or other enforcement agency charged with the administration and enforcement of the provisions of Section 1803.1.1, shall determine that, due to the knowledge such department has as to the soil qualities of the soil of the subdivision or lot, no preliminary analysis is necessary.

1803.1.1.2 Soil investigation by lot, necessity, preparation, and recommendations. *If the preliminary soil report indicates the presence of critically expansive soils or other soil problems which, if not corrected, would lead to structural defects, such ordinance shall require a soil investigation of each lot in the subdivision.*

The soil investigation shall be prepared by a civil engineer who is registered in this state. It shall recommend corrective action which is likely to prevent structural damage to each dwelling proposed to be constructed on the expansive soil.

1803.1.1.3 Approval, building permit conditions, appeal. *The building department of each city, county, or city and county, or other enforcement agency charged with the administration and enforcement of the provisions of Section 1803.1.1, shall approve the soil investigation if it determines that the recommended action is likely to prevent structural damage to each dwelling to be constructed. As a condition to the building permit, the ordinance shall require that the approved recommended action be incorporated in the construction of each dwelling. Appeal from such determination shall be to the local appeals board.*

1803.1.1.4 Liability. *A city, county, city and county, or other enforcement agency charged with the administration and enforcement of the provisions of Section 1803.1.1, is not liable for any injury which arises out of any act or omission of the city, county, city and county, other enforcement agency, or a public employee or any other person under Section 1803.1.1.*

1803.1.1.5 Alternate procedures. *The governing body of any city, county, or city and county may enact an ordinance prescribing an alternate procedure which is equal to or more restrictive than the procedure specified in Section 1803.1.1.*

1803.2 Investigations required. Geotechnical investigations shall be conducted in accordance with Sections 1803.3 through 1803.5.

Exception: The building official shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions in Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.

[OSHPD 2] Geotechnical reports are not required for one-story, wood-frame and light-steel-frame buildings of Type V construction and 4,000 square feet (371 m^2) or less in floor area, not located within Earthquake Fault Zones or Seismic Hazard Zones as shown in the most recently published maps from the California Geological Survey (CGS). Allowable foundation and lateral soil pressure values may be determined from Table 1806.2.

1803.3 Basis of investigation. Soil classification shall be based on observation and any necessary tests of the materials disclosed by borings, test pits or other subsurface exploration made in appropriate locations. Additional studies shall be made as necessary to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction and expansiveness.

1803.3.1 Scope of investigation. The scope of the geotechnical investigation including the number and types of borings or soundings, the equipment used to drill or sample, the in-situ testing equipment and the laboratory testing program shall be determined by a registered design professional.

1803.4 Qualified representative. The investigation procedure and apparatus shall be in accordance with generally accepted engineering practice. The registered design professional shall have a fully qualified representative on site during all boring or sampling operations.

1803.5 Investigated conditions. Geotechnical investigations shall be conducted as indicated in Sections 1803.5.1 through 1803.5.12.

1803.5.1 Classification. Soil materials shall be classified in accordance with ASTM D2487.

1803.5.2 Questionable soil. Where the classification, strength or compressibility of the soil is in doubt or where a load-bearing value superior to that specified in this code is claimed, the building official shall be permitted to require that a geotechnical investigation be conducted.

1803.5.3 Expansive soil. In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist.

extending the bars into the pipe or tube section by at least their development length in tension in accordance with ACI 318.

1810*A*.3.10.2 Materials. Reinforcement shall consist of deformed reinforcing bars in accordance with ASTM A615 Grade 60 or 75 or ASTM A722 Grade 150.

The steel pipe or tube shall have a minimum wall thickness of $^3/_{16}$ inch (4.8 mm). Splices shall comply with Section 1810*A*.3.6. The steel pipe or tube shall have a minimum yield strength of 45,000 psi (310 MPa) and a minimum elongation of 15 percent as shown by mill certifications or two coupon test samples per 40,000 pounds (18 160 kg) of pipe or tube.

1810*A*.3.10.3 Reinforcement. For micropiles or portions thereof grouted inside a temporary or permanent casing or inside a hole drilled into bedrock or a hole drilled with grout, the steel pipe or tube or steel reinforcement shall be designed to carry at least 40 percent of the design compression load. Micropiles or portions thereof grouted in an open hole in soil without temporary or permanent casing and without suitable means of verifying the hole diameter during grouting shall be designed to carry the entire compression load in the reinforcing steel. Where a steel pipe or tube is used for reinforcement, the portion of the grout enclosed within the pipe is permitted to be included.

1810A.3.10.4 Seismic requirements. *For structures assigned to Seismic Design Category D, E or F, a permanent steel casing having a minimum thickness of* $^3/_8$ *inch shall be provided from the top of the micropile down to a minimum of 120 percent of the point of zero curvature. Capacity of micropiles shall be determined in accordance with Section 1810A.3.3 by at least two project-specific preproduction tests for each soil profile, size and depth of micropile. At least two percent of all production piles shall be proof tested to the load determined in accordance with Section 1616A.1.16.*

Steel casing length in soil shall be considered as unbonded and shall not be considered as contributing to friction. Casing shall provide confinement at least equivalent to hoop reinforcing required by ACI 318 Section 18.13.4.

Reinforcement shall have Class 1 corrosion protection in accordance with PTI Recommendations for Prestressed Rock and Soil Anchors. Steel casing design shall include at least $^1/_{16}$*-inch corrosion allowance.*

Micropiles shall not be considered as carrying any horizontal loads.

1810*A*.3.11 Pile caps. Pile caps shall be of reinforced concrete, and shall include all elements to which vertical deep foundation elements are connected, including grade beams and mats. The soil immediately below the pile cap shall not be considered as carrying any vertical load. The tops of vertical deep foundation elements shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend at least 4 inches (102 mm) beyond the edges of the elements. The tops of elements shall be cut or chipped back to sound material before capping.

1810*A*.3.11.1 Seismic Design Categories C through F. For structures assigned to Seismic Design Category C, D, E or F, concrete deep foundation elements shall be connected to the pile cap by embedding the element reinforcement or field-placed dowels anchored in the element into the pile cap for a distance equal to their development length in accordance with ACI 318. It shall be permitted to connect precast prestressed piles to the pile cap by developing the element prestressing strands into the pile cap provided the connection is ductile. For deformed bars, the development length is the full development length for compression, or tension in the case of uplift, without reduction for excess reinforcement in accordance with Section 12.2.5 of ACI 318. Alternative measures for laterally confining concrete and maintaining toughness and ductile-like behavior at the top of the element shall be permitted provided the design is such that any hinging occurs in the confined region.

The minimum transverse steel ratio for confinement shall not be less than one-half of that required for columns.

For resistance to uplift forces, anchorage of steel pipes, tubes or H-piles to the pile cap shall be made by means other than concrete bond to the bare steel section. Concrete-filled steel pipes or tubes shall have reinforcement of not less than 0.01 times the cross-sectional area of the concrete fill developed into the cap and extending into the fill a length equal to two times the required cap embedment, but not less than the development length in tension of the reinforcement.

1810*A*.3.11.2 Seismic Design Categories D through F. For structures assigned to Seismic Design Category D, E or F, deep foundation element resistance to uplift forces or rotational restraint shall be provided by anchorage into the pile cap, designed considering the combined effect of axial forces due to uplift and bending moments due to fixity to the pile cap. Anchorage shall develop a minimum of 25 percent of the strength of the element in tension. Anchorage into the pile cap shall comply with the following:

1. In the case of uplift, the anchorage shall be capable of developing the least of the following:
    - 1.1. The nominal tensile strength of the longitudinal reinforcement in a concrete element;
    - 1.2. The nominal tensile strength of a steel element; and
    - 1.3. The frictional force developed between the element and the soil multiplied by 1.3.

Exception: The anchorage is permitted to be designed to resist the axial tension force resulting from the seismic load effects including overstrength factor in accordance with Section 12.4.3 or 12.14.3.2 of ASCE 7.

1810*A*.3.12 Grade beams. For structures assigned to Seismic Design Category D, E or F, grade beams shall comply with the provisions in Section 18.13.3 of ACI 318 for grade beams, except where they are designed to resist the seismic load effects including overstrength factor in accordance with Section 12.4.3 or 12.14.3.2 of ASCE 7.

1810*A*.3.13 Seismic ties. For structures assigned to Seismic Design Category C, D, E or F, individual deep foundations shall be interconnected by ties. Unless it can be demonstrated that equivalent restraint is provided by reinforced concrete beams within slabs on grade or reinforced concrete slabs on grade or confinement by competent rock, hard cohesive soils or very dense granular soils, ties shall be capable of carrying, in tension or compression, a force equal to the lesser of the product of the larger pile cap or column design gravity load times the seismic coefficient, S_{DS}, divided by 10, and 25 percent of the smaller pile or column design gravity load.

Exception: In Group R-3 and U occupancies of light-frame construction, deep foundation elements supporting foundation walls, isolated interior posts detailed so the element is not subject to lateral loads or exterior decks and patios are not subject to interconnection where the soils are of adequate stiffness, subject to the approval of the building official.

1810*A*.4 Installation. Deep foundations shall be installed in accordance with Section 1810*A*.4. Where a single deep foundation element comprises two or more sections of different materials or different types spliced together, each section shall satisfy the applicable conditions of installation.

1810*A*.4.1 Structural integrity. Deep foundation elements shall be installed in such a manner and sequence as to prevent distortion or damage that may adversely affect the structural integrity of adjacent structures or of foundation elements being installed or already in place and as to avoid compacting the surrounding soil to the extent that other foundation elements cannot be installed properly.

1810*A*.4.1.1 Compressive strength of precast concrete piles. A precast concrete pile shall not be driven before the concrete has attained a compressive strength of at least 75 percent of the specified compressive strength (f'_c), but not less than the strength sufficient to withstand handling and driving forces.

1810*A*.4.1.2 Casing. Where cast-in-place deep foundation elements are formed through unstable soils and concrete is placed in an open-drilled hole, a casing shall be inserted in the hole prior to placing the concrete. Where the casing is withdrawn during concreting, the level of concrete shall be maintained above the bottom of the casing at a sufficient height to offset any hydrostatic or lateral soil pressure. Driven casings shall be mandrel driven their full length in contact with the surrounding soil.

1810*A*.4.1.3 Driving near uncased concrete. Deep foundation elements shall not be driven within six element diameters center to center in granular soils or within one-half the element length in cohesive soils of an uncased element filled with concrete less than 48 hours old unless approved by the building official. If the concrete surface in any completed element rises or drops, the element shall be replaced. Driven uncased deep foundation elements shall not be installed in soils that could cause heave.

1810*A*.4.1.4 Driving near cased concrete. Deep foundation elements shall not be driven within four and one-half average diameters of a cased element filled with concrete less than 24 hours old unless approved by the building official. Concrete shall not be placed in casings within heave range of driving.

1810*A*.4.1.5 Defective timber piles. *Not permitted by DSA-SS, DSA-SS/CC or OSHPD.*

1810*A*.4.2 Identification. Deep foundation materials shall be identified for conformity to the specified grade with this identity maintained continuously from the point of manufacture to the point of installation or shall be tested by an approved agency to determine conformity to the specified grade. The approved agency shall furnish an affidavit of compliance to the building official.

1810*A*.4.3 Location plan. A plan showing the location and designation of deep foundation elements by an identification system shall be filed with the building official prior to installation of such elements. Detailed records for elements shall bear an identification corresponding to that shown on the plan.

1810*A*.4.4 Preexcavation. The use of jetting, augering or other methods of preexcavation shall be subject to the approval of the building official. Where permitted, preexcavation shall be carried out in the same manner as used for deep foundation elements subject to load tests and in such a manner that will not impair the carrying capacity of the elements already in place or damage adjacent structures. Element tips shall be driven below the preexcavated depth until the required resistance or penetration is obtained.

1810*A*.4.5 Vibratory driving. Vibratory drivers shall only be used to install deep foundation elements where the element load capacity is verified by load tests in accordance with Section 1810*A*.3.3.1.2. The installation of production elements shall be controlled according to power consumption, rate of penetration or other approved means that ensure element capacities equal or exceed those of the test elements.

1810*A*.4.6 Heaved elements. Deep foundation elements that have heaved during the driving of adjacent elements shall be redriven as necessary to develop the required capacity and penetration, or the capacity of the element shall be verified by load tests in accordance with Section 1810*A*.3.3.1.2.

1810*A*.4.7 Enlarged base cast-in-place elements. Enlarged bases for cast-in-place deep foundation elements formed by compacting concrete or by driving a precast base shall be formed in or driven into granular soils. Such elements shall be constructed in the same manner as suc-

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 19 – CONCRETE

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	**BSC**	**BSC-CG**	**SFM**	**HCD**			**DSA**			**OSHPD**				**BSCC**	**DPH**	**AGR**	**DWR**	**CEC**	**CA**	**SL**	**SLC**
				1	**2**	**1/AC**	**AC**	**SS**	**SS/CC**	**1**	**2**	**3**	**4**								
Adopt entire chapter																					
Adopt entire chapter as amended (amended sections listed below)	**X**			**X**	**X**				**X**		**X**										
Adopt only those sections that are listed below																					
Chapter / Section																					
1901.1.1									X												
1901.1.2									X												
1901.1.3									X												
1901.1.4									X												
1901.3.1											X										
1901.3.2											X										
1901.3.3											X										
1901.3.4											X										
1905.1.2	X																				
1905.1.3	X																				
1905.1.9	X																				
1907.1.1				X																	
1909									X												

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 19*A* – CONCRETE

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter								X		X			X								
Adopt entire chapter as amended (amended sections listed below)																					
Adopt only those sections that are listed below																					
Chapter / Section																					

The state agency does not adopt sections identified with the following symbol: †
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CHAPTER 19*A*

CONCRETE

Italics are used for text within Sections 1903A through 1905A of this code to indicate provisions that differ from ACI 318.
State of California amendments in these sections are shown in italics and underlined.

SECTION 1901*A*
GENERAL

1901*A*.1 Scope. The provisions of this chapter shall govern the materials, quality control, design and construction of concrete used in structures.

1901A.1.1 Application. *The scope of application of Chapter 19A is as follows:*

1. *Structures regulated by the Division of the State Architect-Structural Safety (DSA-SS), which include those applications listed in Section 1.9.2.1. These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*
2. *Applications listed in Sections 1.10.1, and 1.10.4, regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, skilled nursing facilities, intermediate care facilities, and correctional treatment centers.*

   Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 19 and any applicable amendments therein.*

1901A.1.2 Amendments in this chapter. *DSA-SS and OSHPD adopt this chapter and all amendments.*

> ***Exception:*** *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*
>
> 1. *Division of the State Architect-Structural Safety:*
>
>   ***[DSA-SS]*** *For applications listed in Section 1.9.2.1*
> 2. *Office of Statewide Health Planning and Development.*
>
>   ***[OSHPD 1]*** *– For applications listed in Section 1.10.1.*
>
>   ***[OSHPD 4]*** *– For applications listed in Section 1.10.4.*

1901*A*.2 Plain and reinforced concrete. Structural concrete shall be designed and constructed in accordance with the requirements of this chapter and ACI 318 as amended in Section 1905*A* of this code. Except for the provisions of Sections 1904*A* and 1907*A*, the design and construction of slabs on grade shall not be governed by this chapter unless they transmit vertical loads or lateral forces from other parts of the structure to the soil.

1901*A*.3 Anchoring to concrete. Anchoring to concrete shall be in accordance with ACI 318 as amended in Section 1905*A*, and applies to cast-in (headed bolts, headed studs and hooked J- or L-bolts), post-installed expansion (torque-controlled and displacement-controlled), undercut and adhesive anchors.

1901*A*.4 Composite structural steel and concrete structures. Systems of structural steel acting compositely with reinforced concrete shall be designed in accordance with Section 2206*A* of this code.

1901*A*.5 Construction documents. The construction documents for structural concrete construction shall include:

1. The specified compressive strength of concrete at the stated ages or stages of construction for which each concrete element is designed.
2. The specified strength or grade of reinforcement.
3. The size and location of structural elements, reinforcement and anchors.
4. Provision for dimensional changes resulting from creep, shrinkage and temperature.
5. The magnitude and location of prestressing forces.
6. Anchorage length of reinforcement and location and length of lap splices.
7. Type and location of mechanical and welded splices of reinforcement.
8. Details and location of contraction or isolation joints specified for plain concrete.
9. Minimum concrete compressive strength at time of posttensioning.
10. Stressing sequence for posttensioning tendons.
11. For structures assigned to Seismic Design Category D, E or F, a statement if slab on grade is designed as a structural diaphragm.
12. *Openings larger than 12 inches (305 mm) in any dimension shall be detailed on the structural drawings.*

1901*A*.6 Special inspection. Special inspections and tests of concrete elements of buildings and structures and concreting operations shall be as required by Chapter *17A and Section 1910A.*

SECTION 1902*A*
DEFINITIONS

1902*A*.1 General. The words and terms defined in ACI 318 shall, for the purposes of this chapter and as used elsewhere in this code for concrete construction, have the meanings shown in ACI 318 as modified by Section 1905*A*.1.

SECTION 1903*A*
SPECIFICATIONS FOR TESTS AND MATERIALS

1903*A*.1 General. Materials used to produce concrete, concrete itself and testing thereof shall comply with the applicable standards listed in ACI 318.

> ***Exception:*** *The following standards as referenced in Chapter 35 shall be permitted to be used.*
>
> 1. *ASTM C150*
> 2. *ASTM C595*
> 3. *ASTM C1157*

1903*A*.2 Special inspections. *Where required, special inspections and tests shall be in accordance with Chapter 17A and Section 1910A.*

1903*A*.3 Glass fiber-reinforced concrete. *Glass fiber-reinforced concrete (GFRC) and the materials used in such concrete shall be in accordance with the PCI MNL 128 standard.*

1903*A*.4 Flat wall insulating concrete form (ICF) systems. *Insulating concrete form material used for forming flat concrete walls shall conform to ASTM E2634.* ***[OSHPD 1 & 4]*** *Not Permitted by OSHPD.*

1903A.5 Aggregates *– Modify ACI 318 Section 26.4.1.2.1(a).(1) as follows:*

(1) ***Normal weight aggregate:*** *Aggregate shall be nonreactive as determined by one of the methods in ASTM C33 Appendix XI: Methods for Evaluating Potential for Deleterious Expansion Due to Alkali Reactivity of an Aggregate. Aggregates deemed to be deleterious or potentially deleterious may be used with the addition of a material that has been shown to prevent harmful expansion in accordance with Appendix XI of ASTM C33, when approved by the building official.*

1903A.6 [OSHPD 1 & 4] Limits on cementitious materials. *Modify ACI 318 Section 26.4.2.2(b) and Table 26.4.2.2(b) as follows:*

The maximum percentage of pozzolans, including fly ash and silica fume, and slag cement in concrete assigned to all exposure categories shall be in accordance with Table 26.4.2.2(b) and Section 26.4.2.2(b) Items (1) and (2).

Where pozzolans are used as cementitous materials, duration for minimum specified compressive strength of concrete (f'_c*) that exceeds 28 days shall be considered an alternative system.*

1903A.7 Steel fiber reinforcement *– Not permitted*

1903A.8 Welding of reinforcing bars *– Modify ACI 318 Section 26.6.4.1(b) by adding the following:*

Shop fusion welded stirrup/tie cage (or spiral assemblies) consisting of low-alloy steel reinforcing stirrups/ties conforming to ASTM A706 and longitudinal holding wires, conforming to ASTM A1064 shall be permitted. The fusion welds shall be made by machines using electric resistance welds. Tack welding of primary reinforcing bars together or to stirrups/ties is not permitted. Fusion welding of holding wires is not permitted on any portion of a reinforcing bar that is or will be bent in accordance with ACI 318 Section 25.3.

SECTION 1904*A*
DURABILITY REQUIREMENTS

1904*A*.1 Structural concrete. Structural concrete shall conform to the durability requirements of ACI 318.

1904*A*.2 Nonstructural concrete. *The registered design professional shall assign nonstructural concrete a freeze-thaw exposure class, as defined in ACI 318, based on the anticipated exposure of nonstructural concrete. Nonstructural con-*

crete shall have a minimum specified compressive strength, f'_c, *of 2,500 psi (17.2 MPa) for Class F0; 3,000 psi (20.7 MPa) for Class F1; and 3,500 psi (24.1 MPa) for Classes F2 and F3. Nonstructural concrete shall be air entrained in accordance with ACI 318.*

SECTION 1905*A*
MODIFICATIONS TO ACI 318

1905*A*.1 General. The text of ACI 318 shall be modified as indicated in Sections 1905*A.1.1* through *1905A.1.16*.

1905A.1.1 ACI 318 Section 4.12.2.2. *Modify ACI 318, Section 4.12.2.2 by adding the following:*

Where prestressed concrete elements are restrained from movement, an analysis of the stresses in the prestressed elements and loads in the adjoining structural system induced by the above-described effects shall be made in accordance with PCI Design Handbook.

1905A.1.2 ACI 318, Section 4.12.2.3. *Modify ACI 318 Section 4.12.2.3 by adding the following:*

For prestressed concrete members with recessed or dapped ends, an analysis of the connections shall be made in accordance with procedures given in PCI Design Handbook.

1905A.1.3 ACI 318, Section 9.6.1.3. *Modify ACI 318, Section 9.6.1.3 by adding the following:*

This section shall not be used for members that resist seismic loads, except that reinforcement provided for foundation elements for one-story wood-frame or one-story light steel buildings need not be more than one-third greater than that required by analysis for all loading conditions.

1905A.1.4 ACI 318, Section 11.2.4.1. *Replace ACI 318, Section 11.2.4.1 as follows:*

11.2.4.1 – Walls shall be anchored to intersecting elements such as floors or roofs; or to columns, pilasters, buttresses, of intersecting walls and footings with reinforcement at least equivalent to No. 4 bars at 12 inches (305 mm) on center for each layer of reinforcement.

1905A.1.5 ACI 318 Section 11.7. *Add Section 11.7.6 to ACI 318.1 as follows:*

11.7.6 – ***Reinforcement.*** *Perimeters of precast walls shall be reinforced continuously with a minimum of one No. 5 bar extending the full height and width of the wall panel. Where wall panels do not connect to columns or other wall panels to develop at least 75 percent of the horizontal wall steel as noted below, vertical perimeter bars shall be retained by hooked wall bars.*

A continuous tie or bond beam shall be provided at the roof line either as a part of the roof structure or part of the wall panels as described in the next paragraph below. This tie may be designed as the edge member of the roof diaphragm but, in any case, shall not be less than equivalent to two No. 6 bars continuous. A continuous tie equivalent to two No. 5 bars minimum shall also be provided either in the footing or with an enlarged section of the floor slab.

Wall panels of shear wall buildings shall be connected to columns or to each other in such a manner as to develop at least 75 percent of the horizontal wall steel. No more than half of this continuous horizontal reinforcing shall be concentrated in bond or tie beams at the top and bottom of the walls and at points of intermediate lateral support. If possible, cast-in-place joints with reinforcing bars extending from the panels into the joint a sufficient distance to meet the splice requirements of ACI 318, Section 25.5.2, for Class A shall be used. The reinforcing bars or welded tie details shall not be spaced over eight times the wall thickness vertically nor fewer than four used in the wall panel height. Where wall panels are designed for their respective overturning forces, the panel connections need not comply with the requirements of this paragraph.

Exception: *Nonbearing, nonshear panels such as nonstructural architectural cladding panels or column covers are not required to meet the provisions of this section.*

1905A.1.6 ACI 318, Section 11.9. *Modify ACI 318 by adding Section 11.9 as follows:*

11.9 – ***Foundation walls.*** *Horizontal reinforcing of concrete foundation walls for wood-frame or light-steel buildings shall consist of the equivalent of not less than one No. 5 bar located at the top and bottom of the wall. Where such walls exceed 3 feet (914 mm) in height, intermediate horizontal reinforcing shall be provided at spacing not to exceed 2 feet (610 mm) on center. Minimum vertical reinforcing shall consist of No. 3 bars at 24 inches (610 mm) on center.*

Where concrete foundation walls or curbs extend above the floor line and support wood-frame or light-steel exterior, bearing or shear walls, they shall be doweled to the foundation wall below with a minimum of No. 3 bars at 24 inches (610 mm) on center. Where the height of the wall above the floor line exceeds 18 inches (457 mm), the wall above and below the floor line shall meet the requirements of ACI 318, Section 11.6 and 11.7.

1905A.1.7 ACI 318, Section 12.7.3. *Add Section 12.7.3.4 to ACI 318 as follows:*

12.7.3.4 – At least two No. 5 bars in diaphragms having two layers of reinforcement in both directions and one No. 5 bar in diaphragms having a single layer of reinforcement in both directions shall be provided around openings larger than 12 inches in any dimension in addition to the minimum reinforcement required by Section 12.6.

1905A.1.8 ACI 318, Section 17.2.3. *Modify ACI 318, Sections 17.2.3.4.2, 17.2.3.4.3(d) and 17.2.3.5.2, to read as follows:*

17.2.3.4.2 – Where the tensile component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor tensile force associated with the same load combination, anchors and their attachments shall be designed in accordance with 17.2.3.4.3. The anchor design tensile strength shall be determined in accordance with Section 17.2.3.4.4.

Exception: *Anchors designed to resist wall out-of-plane forces with design strengths equal to or greater than the force determined in accordance with ASCE 7, Equation 12.11-1 or 12.14-10, and*

Section 1604A.8.2 of this code *shall be deemed to satisfy Section 17.2.3.4.3(d).*

17.2.3.4.3(d) – The anchor or group of anchors shall be designed for the maximum tension obtained from design load combinations that include E, with E increased by Ω_0. The anchor design tensile strength shall *be calculated from* 17.2.3.4.4.

17.2.3.5.2 – Where the shear component of the strength-level earthquake force applied to anchors exceeds 20 percent of the total factored anchor shear force associated with the same load combination, anchors and their attachments shall be designed in accordance with 17.2.3.5.3. The anchor design shear strength for resisting earthquake forces shall be determined in accordance with 17.5.

Exceptions:

1. *For the calculation of the in-plane shear strength of anchor bolts attaching wood sill plates of bearing or nonbearing walls of light-frame wood structures to foundations or foundation stem walls, the in-plane design shear strength in accordance with 17.5.2 and 17.5.3 need not be computed and 17.2.3.5.3 shall be deemed to be satisfied, provided all of the following are met:*
    - 1.1. *The allowable in-plane shear strength of the anchor is determined in accordance with AWC NDS Table 11E for lateral design values parallel to grain.*
    - 1.2. *The maximum anchor nominal diameter is $^{5}/_{8}$ inch (16 mm).*
    - 1.3. *Anchor bolts are embedded into concrete a minimum of 7 inches (178 mm).*
    - 1.4. *Anchor bolts are located a minimum of $1^{3}/_{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the wood sill plate.*
    - 1.5. *Anchor bolts are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the wood sill plate.*
    - 1.6. *The sill plate is 2-inch or 3-inch nominal thickness.*
2. *For the calculation of the in-plane shear strength of anchor bolts attaching cold-formed steel track of bearing or nonbearing walls of anchor bolts attaching cold-formed steel track of bearing or nonbearing walls of light-frame construction to foundations or foundation stem walls the in-plane design shear strength in accordance with 17.5.2 and 17.5.3 need not be computed and 17.2.3.5.3 shall be deemed to be satisfied, provided all of the following are met:*
    - 2.1. *The maximum anchor nominal diameter is $^{5}/_{8}$ inch (16 mm).*
    - 2.2. *Anchors are embedded into concrete a minimum of 7 inches (178 mm).*
    - 2.3. *Anchors are located a minimum of $1^{3}/_{4}$ inches (45 mm) from the edge of the concrete parallel to the length of the track.*
    - 2.4. *Anchors are located a minimum of 15 anchor diameters from the edge of the concrete perpendicular to the length of the track.*
    - 2.5. *The track is 33 to 68 mil designation thickness.*

    Allowable in-plane shear strength of exempt anchors, parallel to the edge of concrete shall be permitted to be determined in accordance with AISI S100, Section E3.3.1.
3. *In light-frame construction, bearing or nonbearing walls, shear strength of concrete anchors less than or equal to 1 inch (16 mm) in diameter of sill plate or track to foundation or foundation stem wall need not satisfy 17.2.3.5.3 (a) through (c) when the design strength of the anchors is determined in accordance with 17.5.2.1(c).*

1905A.1.9 ACI 318, Table 19.2.1.1. *Modify ACI 318, Table 19.2.1.1 as follows:*

For concrete designed and constructed in accordance with this chapter, f'_c, shall not be less than 3,000 psi (20.7 MPa). Reinforced normal weight concrete with specified compressive strength higher than 8,000 psi (55 MPa) shall require prior approval of structural design method and acceptance criteria by the enforcement agency.

1905A.1.10 ACI 318, Section 18.5. [DSA-SS] Modify ACI 318, Section 18.5, by *replacing Section 18.5.2.1, adding new Section 18.5.2.2 and renumbering existing Sections 18.5.2.2 and 18.5.2.3 to become 18.5.2.3 and 18.5.2.4, respectively:*

18.5.2.1 – In connections between wall panels, yielding shall be restricted to steel elements or reinforcement. In connections between wall panels and the foundation, they shall be designed per Section 1616A.1.16.

18.5.2.2 – Connections that are designed to yield shall be capable of maintaining 80 percent of their design strength at deformation induced by the design displacement or shall use type 2 mechanical splices.

18.5.2.3 – Elements of the connection that are not designed to yeild shall develop at least 1.5 S_y.

18.5.2.4 – In structures assigned to SDC D, E or F, wall piers shall be designed in accordance with 18.10.8 or 18.14 in ACI 318.

1905A.1.11 ACI 318, Section 18.10.6.5. *Modify ACI 318, Section 18.10.6.5 by adding the following:*

(c) Where boundary members are not required by ACI 318 Section 18.10.6.2 or 18.10.6.3 minimum reinforcement parallel to the edges of all structural walls and the boundaries of all openings shall consist of twice the cross-sectional area of the minimum shear reinforce-

ment required per lineal foot of wall. Horizontal extent of boundary element shall be in accordance with ACI 318 Section 18.10.6.4 (a), (b) and (c).

1905A.1.12 ACI 318, Section 18.12.6. *Add Section 18.12.6.2 to ACI 318 as follows:*

> *18.12.6.2 – Collector and boundary elements in topping slabs placed over precast floor and roof elements shall not be less than 3 inches (76 mm) or 6 d_b thick, where d_b is the diameter of the largest reinforcement in the topping slab.*

1905A.1.13 **ACI 318, Section 18.13.1.1.** Modify ACI 318, Section 18.13.1.1, to read as follows:

> 18.13.1.1 – Foundations resisting earthquake-induced forces or transferring earthquake-induced forces between a structure and ground shall comply with the requirements of 18.13 and other applicable provisions of ACI 318 *unless modified by Chapter 18A of the California Building Code.*

1905A.1.14 ACI 318, Table 21.2.2. *Replace Table 21.2.2 as follows:*

TABLE 21.2.2
STRENGTH REDUCTION FACTOR ϕ FOR MOMENT, AXIAL FORCE, OR COMBINED MOMENT AND AXIAL FORCE

NET TENSILE STRAIN ε_t	CLASSIFICATION	ϕ			
		Type of transverse reinforcement			
		Spirals conforming to 25.7.3		Other	
$\varepsilon_t \le \varepsilon_{ty}$	Compression-controlled	0.75	(a)	0.65	(b)
$\varepsilon_{ty} < \varepsilon_t < 0.005$	Transition[1, 2]	$0.75 + 0.15\dfrac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^* - \varepsilon_{ty}}$	(c)	$0.65 + 0.25\dfrac{\varepsilon_t - \varepsilon_{ty}}{\varepsilon_t^* - \varepsilon_{ty}}$	(d)
$\varepsilon_t \ge 0.005$	Tension-controlled[3]	0.9	(e)	0.9	(f)

1. For sections classified as transition, it shall be permitted to use ϕ corresponding to compression-controlled sections.
2. *ε_t^* is the greater of net tensile strain calculated for $P_n = 0.1A_g f'_c$ and 0.005.*
3. *For sections with factored axial compression force $P_u \ge 0.1A_g f'_c$, ϕ shall be calculated using equation (c) or (d) for sections classified as transition, as applicable.*

1905A.1.15 ACI 318, Section 24.2.1. *Add Section 24.2.1.1 to ACI 318 as follows:*

> *24.2.1.1 – Span to depth ratio. Prestressed Beam and Slab Span to depth ratios for continuous prestressed concrete members shall not exceed the following, except when calculations of deflections and vibration effects prove that greater values may be used without adverse effects:*
>
> | | |
> |---|---|
> | *Beams* | *30* |
> | *One-way slabs* | *40* |
> | *Two-way floor slabs* | *40* |
> | *Two-way roof slabs* | *44* |
>
> *These ratios should be decreased for special conditions such as heavy loads and simple spans.*
>
> *Maximum deflection criteria shall be in accordance with ACI 318 Section 24.2.2.*

1905A.1.16 ACI 318, Section 26.12.2.1(a). *Replace ACI 318 Section 26.12.2.1(a) by the following:*

> *26.12.2.1(a) Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards (345 m^3) of concrete, or not less than once for each 2,000 square feet (186 m^2) of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.*

SECTION 1906*A*
STRUCTURAL PLAIN CONCRETE

Not permitted by OSHPD and DSA-SS

SECTION 1907*A*
MINIMUM SLAB PROVISIONS

1907*A*.1 General. The thickness of concrete floor slabs supported directly on the ground shall not be less than $3^1/_2$ inches (89 mm). A 6-mil (0.006 inch; 0.15 mm) polyethylene vapor retarder with joints lapped not less than 6 inches (152 mm) shall be placed between the base course or subgrade and the concrete floor slab, or other approved equivalent methods or materials shall be used to retard vapor transmission through the floor slab.

Exception: A vapor retarder is not required:

1. For detached structures accessory to occupancies in Group R-3, such as garages, utility buildings or other unheated facilities.
2. For unheated storage rooms having an area of less than 70 square feet (6.5 m^2) and carports attached to occupancies in Group R-3.
3. For buildings of other occupancies where migration of moisture through the slab from below will not be detrimental to the intended occupancy of the building.
4. For driveways, walks, patios and other flatwork that will not be enclosed at a later date.
5. Where approved based on local site conditions.

SECTION 1908*A*
SHOTCRETE

1908*A*.1 General. Shotcrete is mortar or concrete that is pneumatically projected at high velocity onto a surface. Except as specified in this section, shotcrete shall conform to the requirements of this chapter for reinforced concrete *and the provisions of ACI 506. The specified compressive strength of shotcrete shall not be less than 3,000 psi (20.69 MPa).*

Concrete or masonry to receive shotcrete shall have the entire surface thoroughly cleaned and roughened by sand blasting, and just prior to receiving shotcrete, shall be thoroughly cleaned of all debris, dirt and dust. Concrete and *masonry shall be wetted before shotcrete is deposited, but not so wet as to overcome suction. Sand for sand blasting shall be clean, sharp and uniform in size, with no particles that will pass a 50-mesh screen.*

1908*A*.2 Proportions and materials. Shotcrete proportions shall be selected that allow suitable placement procedures using the delivery equipment selected and shall result in finished in-place hardened shotcrete meeting the strength requirements of this code.

1908*A*.3 Aggregate. Coarse aggregate, if used, shall not exceed $^{3}/_{4}$ inch (19.1 mm).

For shear walls, when total rebar in any direction is more than 0.31 in^{2}/ft. or rebar size is larger than # 5, shotcrete shall conform to course aggregate grading No. 2 per Table 1.1 of ACI 506.

1908*A*.4 Reinforcement. Reinforcement used in shotcrete construction shall comply with the provisions of Sections 1908*A*.4.1 through 1908*A*.4.4.

1908*A*.4.1 Size. The maximum size of reinforcement shall be No. 5 bars unless it is demonstrated by preconstruction tests that adequate encasement of larger bars will be achieved.

1908*A*.4.2 Clearance. When No. 5 or smaller bars are used, there shall be a minimum clearance between parallel reinforcement bars of 2$^{1}/_{2}$ inches (64 mm). When bars larger than No. 5 are permitted, there shall be a minimum clearance between parallel bars equal to six diameters of the bars used. When two curtains of steel are provided, the curtain nearer the nozzle shall have a minimum spacing equal to 12 bar diameters and the remaining curtain shall have a minimum spacing of six bar diameters.

Exception: Subject to the approval of the building official, required clearances shall be reduced where it is demonstrated by preconstruction tests that adequate encasement of the bars used in the design will be achieved.

1908*A*.4.3 Splices. Lap splices of reinforcing bars shall utilize the noncontact lap splice method with a minimum clearance of 2 inches (51 mm) between bars. The use of contact lap splices necessary for support of the reinforcing is permitted when approved by the building official, based on satisfactory preconstruction tests that show that adequate encasement of the bars will be achieved, and provided that the splice is oriented so that a plane through the center of the spliced bars is perpendicular to the surface of the shotcrete.

1908*A*.4.4 Spirally tied columns. Shotcrete shall not be applied to spirally tied columns.

1908*A*.5 Preconstruction tests. *A* test panel shall be shot, cured, cored or sawn, examined and tested prior to commencement of the project. The sample panel shall be representative of the project and simulate job conditions as closely as possible. The panel thickness and reinforcing shall reproduce the thickest and most congested area specified in the structural design. It shall be shot at the same angle, using the same nozzleman and with the same concrete mix design that will be used on the project. The equipment used in preconstruction testing shall be the same equipment used in the work requiring such testing, unless substitute equipment is approved by the building official. Reports of preconstruction tests shall be submitted to the building official as specified in Section 1704*A*.5.

1908*A*.6 Rebound. Any rebound or accumulated loose aggregate shall be removed from the surfaces to be covered prior to placing the initial or any succeeding layers of shotcrete. Rebound shall not be used as aggregate.

1908*A*.7 Joints. Except where permitted herein, unfinished work shall not be allowed to stand for more than 30 minutes unless edges are sloped to a thin edge. For structural elements that will be under compression and for construction joints shown on the approved construction documents, square joints are permitted. Before placing additional material adjacent to previously applied work, sloping and square edges shall be cleaned and wetted.

The film of laitance which forms on the surface of the shotcrete shall be removed within approximately two hours after application by brushing with a stiff broom. If this film is not removed within two hours, it shall be removed by thorough wire brushing or sand blasting. Construction joints over eight hours old shall be thoroughly cleaned with air and water prior to receiving shotcrete.

1908*A*.8 Damage. In-place shotcrete that exhibits sags, sloughs, segregation, honeycombing, sand pockets or other obvious defects shall be removed and replaced. Shotcrete above sags and sloughs shall be removed and replaced while still plastic.

1908*A*.9 Curing. During the curing periods specified herein, shotcrete shall be maintained above 40°F (4°C) and in moist condition.

1908*A*.9.1 Initial curing. Shotcrete shall be kept continuously moist for 24 hours after shotcreting is complete or shall be sealed with an approved curing compound.

1908*A*.9.2 Final curing. Final curing shall continue for seven days after shotcreting, or for three days if high-early-strength cement is used, or until the specified strength is obtained. Final curing shall consist of the initial curing process or the shotcrete shall be covered with an approved moisture-retaining cover.

1908*A*.9.3 Natural curing. Natural curing shall not be used in lieu of that specified in this section unless the relative humidity remains at or above 85 percent, and is authorized by the registered design professional and approved by the building official.

1908*A*.10 Strength tests. Strength tests for shotcrete shall be made *in accordance with ASTM C1604* by an approved agency on specimens that are representative of the work and which have been water soaked for at least 24 hours prior to testing. When the maximum-size aggregate is larger than $^{3}/_{8}$ inch (9.5 mm), specimens shall consist of not less than three 3-inch-diameter (76 mm) cores or 3-inch (76 mm) cubes. When the maximum-size aggregate is $^{3}/_{8}$ inch (9.5 mm) or smaller, specimens shall consist of not less than 2-inch-diameter (51 mm) cores or 2-inch (51 mm) cubes.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 21*A* – MASONRY

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter								X		X			X								
Adopt entire chapter as amended (amended sections listed below)																					
Adopt only those sections that are listed below			X																		
Chapter / Section																					
2113A.9.2			X																		

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 21*A*

MASONRY

SECTION 2101*A*
GENERAL

2101*A*.1 Scope. This chapter shall govern the materials, design, construction and quality of masonry.

2101A.1.1 Application. *The scope of application of Chapter 21A is as follows:*

1. *Applications listed in Section 1.9.2.1 regulated by the Division of the State Architect-Structural Safety (DSA-SS). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*
2. *Applications listed in Sections 1.10.1, and 1.10.4 regulated by the Office of Statewide Health Planning and Development (OSHPD).These applications include hospitals, skilled nursing facilities, intermediate care facilities and correctional treatment centers.*

    Exception: [OSHPD 2] *Single-story Type V skilled nursing or intermediate care facilities utilizing wood-frame or light-steel-frame construction as defined in Health and Safety Code Section 129725, which shall comply with Chapter 21 and any applicable amendments therein.*

2101A.1.2 Amendments in this chapter. *DSA-SS and OSHPD 1 & 4 adopt this chapter and all amendments.*

Exception: *Amendments adopted by only one agency appear in this chapter preceded with the appropriate acronym of the adopting agency, as follows:*

1. *Division of the State Architect-Structural Safety:*

    [DSA-SS] *For applications listed in Section 1.9.2.1.*

2. *Office of Statewide Health Planning and Development:*

    [OSHPD 1] - *For applications listed in Section 1.10.1.*

    [OSHPD 4] - *For applications listed in Section 1.10.4.*

2101A.1.3 Prohibition: *The following design, systems, and materials are not permitted by DSA-SS and OSHPD:*

1. *Unreinforced masonry*
2. *Autoclaved aerated concrete (AAC) masonry*
3. *Empirical design of masonry*
4. *Adobe construction*
5. *Ordinary reinforced masonry shear walls*
6. *Intermediate reinforced masonry shear walls*
7. *Prestressed masonry shear walls*
8. *Direct design of masonry*

2101*A*.2 Design methods. Masonry shall comply with the provisions of TMS 402/ACI 530/ASCE 5 as well as applicable requirements of this chapter.

2101*A*.2.1 Masonry veneer. Masonry veneer shall comply with the provisions of Chapter 14.

2101*A*.3 Special inspection. The special inspection of masonry shall be as defined in Chapter 17*A*, or an itemized testing and inspection program shall be provided that meets or exceeds the requirements of Chapter 17*A*.

SECTION 2102*A*
DEFINITIONS AND NOTATIONS

2102*A*.1 General. The following terms are defined *in Chapter 2, except those defined below which shall, for the purposes of this chapter, have the meanings shown herein:*

AAC MASONRY.

ADOBE CONSTRUCTION.

Adobe, stabilized.
Adobe, unstabilized.

AREA.

Gross cross-sectional.
Net cross-sectional.

AUTOCLAVED AERATED CONCRETE (AAC).

BED JOINT.

BRICK.

Calcium silicate (sand lime brick).
Clay or shale.
Concrete.

CAST STONE.

CELL.

CHIMNEY.

CHIMNEY TYPES.

High-heat appliance type.
Low-heat appliance type.
Masonry type.
Medium-heat appliance type.

CLEANOUT.

COLLAR JOINT.

DIMENSIONS.

Nominal.
Specified.

FIREPLACE.

FIREPLACE THROAT.

FOUNDATION PIER.

HEAD JOINT.

MASONRY.

Ashlar masonry.
Coursed ashlar.
Glass unit masonry.
Plain masonry.
Random ashlar.
Reinforced masonry.
Solid masonry.
Unreinforced (plain) masonry.

MASONRY UNIT.

Hollow.
Solid.

MORTAR.

MORTAR, SURFACE-BONDING.

PRESTRESSED MASONRY.

RUNNING BOND.

SHEAR WALL.

Detailed plain masonry shear wall.
Intermediate prestressed masonry shear wall.
Intermediate reinforced masonry shear wall.
Ordinary plain masonry shear wall.
Ordinary plain prestressed masonry shear wall.
Ordinary reinforced masonry shear wall.
Special prestressed masonry shear wall.
Special reinforced masonry shear wall.

SPECIFIED.

SPECIFIED COMPRESSIVE STRENGTH OF MASONRY, f'_m.

STONE MASONRY.

Ashlar stone masonry.
Rubble stone masonry.

STRENGTH.

Design strength.
Nominal strength.
Required strength.

TIE, WALL.

TILE, STRUCTURAL CLAY.

WALL.

Cavity wall.
Composite wall.
Dry-stacked, surface-bonded wall.
Hollow-unit masonry wall. *Type of construction made with hollow masonry units in which the units are laid and set in mortar, reinforced and grouted.*
Masonry-bonded hollow wall.
Parapet wall.

WYTHE.

NOTATIONS.

d_b = Diameter of reinforcement, inches (mm).

F_s = Allowable tensile or compressive stress in reinforcement, psi (MPa).

f_r = Modulus of rupture, psi (MPa).

f'_{AAC} = Specified compressive strength of AAC masonry, the minimum compressive strength for a class of AAC masonry as specified in ASTM C1386, psi (MPa).

f'_m = Specified compressive strength of masonry at age of 28 days, psi (MPa).

f'_{mi} = Specified compressive strength of masonry at the time of prestress transfer, psi (MPa).

K = The lesser of the masonry cover, clear spacing between adjacent reinforcement, or five times d_b, inches (mm).

L_s = Distance between supports, inches (mm).

l_d = Required development length or lap length of reinforcement, inches (mm).

P = The applied load at failure, pounds (N).

2. *The two wythes shall be bonded together with wall ties. Ties shall not be less than No. 9 wire in the form of rectangles 4 inches (102 mm) wide and 2 inches (51 mm) in length less than the overall wall thickness. Kinks, water drips, or deformations shall not be permitted in the ties. One tier of the wall shall be built up not more than 16 inches (406 mm) ahead of the other tier. Ties shall be laid not to exceed 24 inches (610 mm) on center horizontally and 16 inches (406 mm) on center vertically for running bond, and not more than 24 inches (610 mm) on center horizontally and 12 inches (305 mm) on center vertically for stack bond.*
3. *Cleanouts shall be provided for each pour by leaving out every other unit in the bottom tier of the section being poured or by cleanout openings in the foundation. The foundation or other horizontal construction joints shall be cleaned of all loose material and mortar droppings before each pour. The cleanouts shall be sealed after inspection and before grouting.*
4. *The grout space in high-lift grouted masonry shall be a minimum of* $3^{1}/_{2}$ *inches (89 mm). All reinforcent and wire ties shall be embedded in the grout. The thickness of the grout between masonry units and reinforcent shall be a minimum of one bar diameter.*
5. *Vertical grout barriers or dams of solid masonry shall be built across the grout space the entire height of the wall to control the flow of the grout horizontally. Grout barriers shall be spaced not more than 30 feet (9144 mm) apart.*
6. *An approved admixture of a type that reduces early water loss and produces an expansive action shall be used in high-lift grout.*
7. *Grouting shall be done in a continuous pour in lifts not exceeding 4 feet (1219 mm). Grout shall be consolidated by mechanical vibration only, and shall be reconsolidated after excess moisture has been absorbed, but before plasticity is lost. The grouting of any section of a wall between control barriers shall be completed in one day, with no interruptions greater than one hour.*

2104A.1.3.1.2 Reinforced hollow-unit masonry.

2104A.1.3.1.2.1 General. *Reinforced hollow-unit masonry is that type of construction made with hollow-masonry units in which cells are continuously filled with grout, and in which reinforcement is embedded. All cells shall be solidly filled with grout in reinforced hollow-unit masonry.*

Exception: *Reinforced hollow-unit masonry laid in running bond used for freestanding site walls or interior nonbearing non-shear wall partitions may be grouted only in cells containing vertical and horizontal reinforcement.*

Construction shall be one of the two following methods: The low-lift method where the maximum height of construction laid before grouting is 4 feet (1220 mm), or the high-lift method where the full height of construction between horizontal cold joints is grouted in one operation. General requirements for construction shall be as follows:

1. *Bond shall be provided by lapping units in successive vertical courses. Where stack bond is used in reinforced hollow-unit masonry, the open-end type of unit shall be used with vertical reinforcement spaced a maximum of 16 inches (406 mm) on center.*
2. *Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear grout space dimension of not less than 2 inches by 3 inches (51 mm by 76 mm), except the minimum cell dimension for high-lift grout shall be 3 inches (76 mm), as determined in accordance with TMS 602 Table 7, footnote 3.*
3. *Grout shall be a workable mix suitable for placing without segregation and shall be thoroughly mixed. Grout shall be placed by pumping or an approved alternate method and shall be placed before initial set or hardening occurs. Grout shall be consolidated by mechanical vibration during placing and reconsolidated after excess moisture has been absorbed, but before workability is lost.*
4. *All reinforcement and wire ties shall be embedded in the grout. The space between masonry unit surfaces and reinforcement shall be a minimum of one bar diameter.*
5. *Horizontal reinforcement shall be placed in bond beam units with a minimum grout cover of 1 inch (25 mm) above steel for each grout pour. The depth of the bond beam channel below the top of the unit shall be a minimum of* $1^{1}/_{2}$ *inches (38 mm) and the width shall be 3 inches (76 mm) minimum.*

2104A.1.3.1.2.2 Low-lift grouted construction. *Units shall be laid a maximum of 4 feet (1220 mm) before grouting. Grouting shall follow each 4 feet (1220 mm) of construction laid and shall be consolidated so as to completely fill all voids and embed all reinforcing steel. Horizontal reinforce-*

ment shall be fully embedded in grout in an uninterrupted pour.

2104A.1.3.1.2.3 High-lift grouted construction. *Where high-lift grouting is used, the method shall be approved by the enforcement agency. Cleanout openings shall be provided in every cell at the bottom of each pour of grout. Alternatively, if the course at the bottom of the pour is constructed entirely of inverted double open-end bond beam units, cleanout openings need only be provided for access to every reinforced cell at the bottom of each pour of grout. The cleanouts shall be sealed before grouting. An approved admixture that reduces early water loss and produces an expansive action shall be used in the grout.*

SECTION 2105*A*
QUALITY ASSURANCE

2105*A*.1 General. A quality assurance program shall be used to ensure that the constructed masonry is in compliance with the approved construction documents.

The quality assurance program shall comply with the inspection and testing requirements of Chapter 17 and TMS 602/ACI 530.1/ASCE 6.

2105A.2 Compressive strength, f'_m. *The specified compressive strength, f'_m, assumed in design shall be 2,000 psi (13.79 MPa) for all masonry construction using materials and details of construction required herein. Testing of the constructed masonry shall be provided in accordance with Section 2105A.4.*

> ***Exception:*** *Subject to the approval of the enforcement agency, higher values of f'_m may be used in the design of reinforced grouted masonry and reinforced hollow-unit masonry. The approval shall be based on prism test results submitted by the architect or engineer which demonstrate the ability of the proposed construction to meet prescribed performance criteria for strength and stiffness. The design shall take into account the mortar joint depth. In no case shall the f'_m assumed in design exceed 3,000 psi (20.7 MPa).*
>
> *Where an f'_m greater than 2,000 psi (13.79 MPa) is approved, the architect or structural engineer shall establish a method of quality control of the masonry construction acceptable to the enforcement agency which shall be described in the contract specifications. Compliance with the requirements for the specified strength of constructed masonry shall be provided using prism test method and core shear testing in accordance with Section 2105A.4. Substantiation for the specified compressive strength prior to the start of construction shall be obtained by using prism test method and Section 2105A.3.*

2105A.3 Mortar and grout tests. *These tests are to establish whether the masonry components meet the specified component strengths. At the beginning of all masonry work, at least one test sample of the mortar shall be taken on three successive working days and at least at one-week intervals thereafter. Samples of grout shall be taken for each mix design, each day grout is placed, and not less than every 5,000 square feet of masonry wall area. They shall meet the minimum strength requirement given in ASTM C270 Table 1 and ASTM C476/TMS 602 Section 2.2 for mortar and grout respectively. Additional samples shall be taken whenever any change in materials or job conditions occur, as determined by the building official. When the prism test method is used during construction, the tests in this section are not required.*

Test specimens for mortar and grout shall be made as set forth in ASTM C1586 and ASTM C1019.

Exceptions:

1. ***[DSA-SS & OSHPD 1 & 4]*** *For non-bearing nonshear masonry walls not exceeding total wall height of 12' above wall base, mortar test shall be permitted to be limited to those at the beginning of masonry work for each mix design.*
2. ***[DSA-SS]*** *Mortar sampling and testing shall be as follows: At the beginning of all masonry work, mortar test samples shall be taken on three successive working days and at least at one-week intervals thereafter. Where mortar is based on a proportion specification, mortar shall be sampled and tested during construction in accordance with ASTM C780 Annex 4 and 5 to verify the proportions specified in ASTM C270, Table 2. Where mortar is based on a property specification, mortar shall be laboratory prepared and tested prior to construction in accordance with ASTM C780 to verify the properties specified in ASTM C270, Table 1 and field sampled and tested during construction in accordance with ASTM C780 to verify the proportions with the laboratory tests. Mortar sampling and testing is not required for approved preblended mortars in conformance with ASTM C270.*

2105A.4 Masonry core testing. *Not less than two cores shall be taken from each building for each 5,000 square feet (465 m^2) of the masonry wall area or fraction thereof. The approved agency shall perform or observe the coring of the masonry walls and sample locations shall be subject to approval of the registered design professional.*

Core samples shall comply with the following:

1. *Cored no sooner than 7 days after grouting of the selected area;*
2. *Be a minimum of $3^3/_4$" in nominal diameter; and*
3. *Sampled in such a manner as to exclude any masonry unit webs, mortar joint, or reinforcing steel. If all cells contain reinforcement, alternate core locations or means to detect void or delamination shall be selected by the registered design professional and approved by the building official.*

Visual examination of all cores shall be made by an approved agency and the condition of the cores reported as required by the California Administrative Code. Shear test *seismic load, provided the connection or other mechanism within the column base is designed to have the ductility necessary to accommodate the column base rotation resulting from the design story drift.*

2205A.3.4 Section D2. *Add Section D2.9 as follows:*

9. Diaphragm bracing systems. *The required strength of the connections of diagonal bracing members used as the diaphragm shall be the load effect required for collectors using the load combinations stipulated in the applicable building code.*

2205A.3.5 Section F1. *Add Section F1.4c as follows:*

4c. Multi-tiered braced frames: *Braced frames configured with two or more tiers of bracing between diaphragm levels or locations of out-of-plane support shall comply with the additional requirements of Section F2.4e.*

2205A.3.6 Section F2. *Modify Section F2.3 Exception (2)(a) as follows:*

(a) The *maximum of the* forces determined using load combination stipulated by the applicable building code including the amplified seismic load, applied to the building frame model in which all compression braces have been removed *and those determined with no compression braces removed per D1.4a(2).*

2205A.3.7 Section F2. *Modify Section F2.4a by adding the following:*

Where each framing bay on a line of resistance does not have opposing diagonal braces within the same column bay, then the collector forces along that line shall be designed considering the redistribution of seismic forces to other bays as a result of the post-buckled redistribution of loads using the analysis requirements of Section F2.3. The collector shall not be designed for a load less than that stipulated by the applicable building code.

The required strength of the collector need not exceed the forces determined using load combination stipulated by the applicable building code, including the amplified seismic load, applied to the building model in which all compression braces have been removed.

2205A.3.8 Section F2. *Add Section F2.4e as follows:*

4c. Multi-tiered braced frames: *Braced frames configured with two or more tiers of bracing between diaphragm levels or locations of out-of-plane support shall comply with the additional requirements of this section:*

(1) Braces shall be used in symmetrical pairs at every tier level.

(2) Horizontal beams at intermediate tier levels for V- and inverted V-brace configurations shall have out-of-plane strength, stiffness, and beam-to-column connections adequate to resist torsional moments arising from brace buckling when braces are designed to buckle out-of-plane.

(3) Columns shall be restrained against rotation about their longitudinal axis at each intermediate tier level and shall resist out-of-plane bending moments due to second-order effects, geometric imperfections, and out-of-plane brace buckling.

2205A.4 Modifications to AISC 341. [OSHPD 1 and 4]

2205A.4.1 Glossary. *Modify glossary by adding the following:*

Inelastic Rotation: *The permanent or plastic portion of the rotation angle between a beam and the column, or between a link and the column of the test specimen, measured in radians. The inelastic rotation shall be computed based upon an analysis of the test specimen deformations. Sources of inelastic rotation include yielding of members and connectors, yielding of connection elements and slip between members and connection elements. For beam-to-column moment connections in special moment frames, the inelastic rotation is represented by the plastic chord rotation angle calculated as the plastic deflection of the beam or girder, at the center of its span divided by the distance between the center of the beam span and the centerline of the panel zone of the beam-column connection. For link-to-column connections in eccentrically braced frames, inelastic rotation shall be computed based upon the assumption that inelastic action is concentrated at a single point located at the intersection of the centerline of the link with the face of the column.*

2205A.4.2 Section E2. *Replace Section E2.6c Item (a) by the following:*

(a) Use of IMF connections designed in accordance with ANSI/AISC 358 shall be as modified in Section 2205A.5.2.

2205A.4.3 Section E3. *Replace Section E3.6b Item 1 by the following:*

(1) The connection shall be capable of sustaining an interstory drift angle of at least 0.04 radians and an inelastic rotation of 0.03 radians.

2205A.4.4 Section E3. *Replace Section E3.6c Item (a) by the following:*

(a) Use of SMF connections designed in accordance with ANSI /AISC 358 shall be as modified in Section 2205A.5.

2205A.4.5 Section F2. *Special concentrically braced frames (SCBF) modifications*

5b. Diagonal braces, Add a new section as follows.

(4) The use of rectangular or square HSS are not permitted for bracing members, unless filled solid with cement grout having a minimum compressive strength of 3000 psi at 28 days. The effects of composite action in the filled composite brace shall be considered in the sectional properties of the system where it results in the more severe loading condition or detailing.

2205A.4.6 Section F3. *Modify Section F3.6e Item 2 as follows:*

Exception is not permitted.

2205A.4.7 Section K2. *Replace Section K2.3b as follows:*

The size of the beam or link used in the test specimen shall be within the following limits:

1. *At least one of the test beams or links shall be no less than 100 percent of the depth of the prototype beam or link. For the remaining specimens, the depth of the test beam or link shall be no less than 90 percent of the depth of the prototype beam or link.*
2. *At least one of the test beams or links shall be no less than 100 percent of the weight per foot of the prototype beam or link. For the remaining specimens, the weight per foot of the test beam or link shall be no less than 75 percent of the weight per foot of the prototype beam or link.*

The size of the column used in the test specimen shall properly represent the inelastic action in the column, as per the requirements in Section K2.3a. In addition, the depth of the test column shall be no less than 90 percent of the depth of the prototype column.

Extrapolation beyond the limitations stated in this section shall be permitted subject to peer review and approval by the enforcement agency.

2205A.4.8 Section K2. *Modify Section K2.8 by the following:*

> *The test specimen must sustain the required interstory drift angle, or link rotation angle, and inelastic rotation for at least two complete loading cycles.*

2205A.5 Modifications to AISC 358. [OSHPD 1 and 4]

2205A.5.1. *Design Requirements, 2.1 Special and Intermediate Moment Frame Connection Types, Table 2-1 Prequalified Moment Connections modifications.*

The prequalified bolted moment connections are not permitted in buildings.

Exceptions:

1. *Erection bolts are permitted.*
2. *The approved moment connection in accordancewith AISC 358 Chapter 10 as permitted by the exception to Section 2206A.2.*

2205A.5.2 Moment Connection - Chapter 11. *The welded side plate steel moment connection shall be permitted provided:*

1. *The beams shall consist of either rolled or built-up wide flange sections.*
2. *The biaxial dual-strong axis and column minor axis configurations of the moment connection shall be considered as an alternative system.*
3. *For SMF and IMF systems, U-shaped cover plates shall be used and the hinge-to-hinge span to beam depth, L_h/d, shall be greater than or equal to 5.*
4. *The width-to-thickness ratios for beam flanges shall not be less than 3.*
5. *The spacing for lateral bracing of wide flange beams, L_b, shall include the length of the side plate at beam ends.*
6. *The extension of the side plates beyond the face of the column shall be within the range of 0.77d to 1.0d.*
7. *The gap-to-side plate thickness ratio shall range from 2.1 to 2.3.*

SECTION 2206*A*
COMPOSITE STRUCTURAL STEEL AND CONCRETE STRUCTURES

2206*A*.1 General. Systems of structural steel elements acting compositely with reinforced concrete shall be designed in accordance with AISC 360 and ACI 318, excluding ACI 318 Chapter 14.

2206*A*.2 Seismic design. Where required, the seismic design, fabrication and erection of composite steel and concrete systems shall be in accordance with Section 2206*A*.2.1.

2206*A*.2.1 Seismic requirements for composite structural steel and concrete construction. Where a response modification coefficient, *R*, in accordance with ASCE 7, Table 12.2-1, is used for the design of systems of structural steel acting compositely with reinforced concrete, the structures shall be designed and detailed in accordance with the requirements of AISC 341 *and shall be considered as an alternative system.*

Exception: *Steel and concrete composite special moment frame with the approved moment connections in accordance with AISC 358 Chapter 10 shall be permitted, provided:*

1. *Beams are provided with reduced beam sections (RBS),*
2. *Web extension to beam web two-sided fillet weld welds are sized to develop expected strength of the beam web and shall not be less than a $^1/_4$ inch fillet weld, and*
3. *The built-up box column wall thickness shall not be less than 1.25 inches and the HSS column wall thickness shall not be less than $^1/_2$ inch.*

SECTION 2207*A*
STEEL JOISTS

2207*A*.1 General. The design, manufacture and use of open-web steel joists and joist girders shall be in accordance with one of the following Steel Joist Institute (SJI) specifications:

1. SJI CJ
2. SJI K
3. SJI LH/DLH
4. SJI JG

2207*A*.1.1 Seismic design. Where required, the seismic design of buildings shall be in accordance with the additional provisions of Section 2205*A*.2 or 2211*A*.6.

2207*A*.2 Design. The registered design professional shall indicate on the construction documents the steel joist and steel joist girder designations from the specifications listed in Section 2207*A*.1; and shall indicate the requirements for joist and joist girder design, layout, end supports, anchorage, bridging design that differs from the SJI specifications listed in Section 2207*A*.1, bridging termination connections and bearing connection design to resist uplift and lateral loads. These documents shall indicate special requirements as follows:

1. Special loads including:
    - 1.1. Concentrated loads.
    - 1.2. Nonuniform loads.
    - 1.3. Net uplift loads.
    - 1.4. Axial loads.
    - 1.5. End moments.
    - 1.6. Connection forces.
2. Special considerations including:
    - 2.1. Profiles for joist and joist girder configurations that differ from those defined by the SJI specifications listed in Section 2207*A*.1.
    - 2.2. Oversized or other nonstandard web openings.
    - 2.3. Extended ends.
3. Live and total load deflection criteria for joists and joist girder configurations that differ from those defined by the SJI specifications listed in Section 2207*A*.1.

2207*A*.3 Calculations. The steel joist and joist girder manufacturer shall design the steel joists and steel joist girders in accordance with the SJI specifications listed in Section 2207*A*.1 to support the load requirements of Section 2207*A*.2. The registered design professional shall be permitted to require submission of the steel joist and joist girder calculations as prepared by a registered design professional responsible for the product design. Where requested by the registered design professional, the steel joist manufacturer shall submit design calculations with a cover letter bearing the seal and signature of the joist manufacturer's registered design professional. In addition to the design calculations submitted under seal and signature, the following shall be included:

1. Bridging design that differs from the SJI specifications listed in Section 2207*A*.1, such as cantilevered conditions and net uplift.
2. Connection design for:
    - 2.1. Connections that differ from the SJI specifications listed in Section 2207*A*.1, such as flush-framed or framed connections.
    - 2.2. Field splices.
    - 2.3. Joist headers.

2207*A*.4 Steel joist drawings. Steel joist placement plans shall be provided to show the steel joist products as specified on the approved construction documents and are to be utilized for field installation in accordance with specific project requirements as stated in Section 2207*A*.2. Steel joist placement plans shall include, at a minimum, the following:

1. Listing of applicable loads as stated in Section 2207*A*.2 and used in the design of the steel joists and joist girders as specified in the approved construction documents.
2. Profiles for joist and joist girder configurations that differ from those defined by the SJI specifications listed in Section 2207*A*.1.
3. Connection requirements for:
    - 3.1. Joist supports.
    - 3.2. Joist girder supports.
    - 3.3. Field splices.
    - 3.4. Bridging attachments.
4. Live and total load deflection criteria for joists and joist girder configurations that differ from those defined by the SJI specifications listed in Section 2207*A*.1.
5. Size, location and connections for bridging.
6. Joist headers.

2207A.4.1 Design approval. [DSA-SS] *Joist and joist girder design calculations and profiles with member sizes and connection details, and joist placement plans shall be provided to the enforcement agency and approved prior to joist fabrication, in accordance with the California Administrative Code (Title 24, Part 1). Joist and joist girder design calculations and profiles with member sizes and connection details shall bear the signature and stamp or seal of the registered engineer or licensed architect responsible for the joist design. Alterations to the approved joist and joist girder design calculations and profiles with member sizes and connection details, or to fabricated joists are subject to the approval of the enforcement agency.*

2207A.5 **Certification.** At completion of manufacture, the steel joist manufacturer shall submit a certificate of compliance to the owner or the owner's authorized agent for submittal to the building official as specified in Section 1704.5 stating that work was performed in accordance with approved construction documents and with SJI specifications listed in Section 2207*A*.1.

2207A.6 Joist chord bracing. *The chords of all joists shall be laterally supported at all points where the chords change direction.*

SECTION 2208*A*
STEEL CABLE STRUCTURES

2208*A*.1 General. The design, fabrication and erection including related connections, and protective coatings of steel cables for buildings shall be in accordance with ASCE 19.

SECTION 2209*A*
STEEL STORAGE RACKS

2209*A*.1 Storage racks. The design, testing and utilization of storage racks made of cold-formed or hot-rolled steel structural members shall be in accordance with RMI/ANSI MH 16.1. Where required by ASCE 7, the seismic design of storage racks shall be in accordance with Section 15.5.3 of ASCE 7.

SECTION 2210*A*
COLD-FORMED STEEL

2210*A*.1 General. The design of cold-formed carbon and low-alloy steel structural members shall be in accordance with AISI S100. The design of cold-formed stainless-steel structural members shall be in accordance with ASCE 8. Cold-formed steel light-frame construction shall also comply with Section 2211*A*. Where required, the seismic design of cold-formed steel structures shall be in accordance with the additional provisions of Section 2210*A*.2.

2210*A*.1.1 Steel decks. The design and construction of cold-formed steel decks shall be in accordance with this section.

2210*A*.1.1.1 Noncomposite steel floor decks. Noncomposite steel floor decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-NC1.0.

2210*A*.1.1.2 Steel roof deck. Steel roof decks shall be permitted to be designed and constructed in accordance with ANSI/SDI-RD1.0. *The base material thickness of steel deck shall not be less than 0.0359 inch (0.9 mm) (20 gage).*

Exception: [DSA-SS] *For single-story open structures, the minimum deck thickness may be waived if the steel roof deck need not be used as the diaphragm and there are no suspended hangers or bracing for nonstructural components attached to the deck.*

2210*A*.1.1.3 Composite slabs on steel decks. Composite slabs of concrete and steel deck shall be permitted to be designed and constructed in accordance with SDI-C.

2210*A*.2 Seismic requirements for cold-formed steel structures. Where a response modification coefficient, *R*, in accordance with ASCE 7, Table 12.2-1, is used for the design of cold-formed steel structures, the structures shall be designed and detailed in accordance with the requirements of AISI S100 *and* ASCE 8.

SECTION 2211*A*
COLD-FORMED STEEL LIGHT-FRAME CONSTRUCTION

2211*A*.1 General. The design and installation of structural and nonstructural members utilized in cold-formed steel light-frame construction where the specified minimum base steel thickness is not greater than 0.1180 inches (2.997 mm) shall be in accordance with AISI S200 and Sections 2211*A*.2 through 2211*A*.7, or AISI S220, as applicable.

2211*A*.2 Header design. Headers, including box and back-to-back headers, and double and single L-headers shall be designed in accordance with AISI S212 or AISI S100.

2211*A*.3 Truss design. Cold-formed steel trusses shall be designed in accordance with AISI S214, Sections 2211*A*.3.1 through 2211*A*.3.4 and accepted engineering practice.

Complete engineering analysis and truss design drawings shall accompany the construction documents submitted to the enforcement agency for approval. When load testing is required, the test report shall be submitted with the truss design drawings and engineering analysis to the enforcement agency.

2211*A*.3.1 Truss design drawings. The truss design drawings shall conform to the requirements of Section B2.3 of AISI S214 and shall be provided with the shipment of trusses delivered to the job site. The truss design drawings shall include the details of permanent individual truss member restraint/bracing in accordance with Section B of AISI S214 where these methods are utilized to provide restraint/bracing.

2211*A*.3.2 Deferred submittals. *Not permitted by DSA-SS and OSHPD.*

2211*A*.3.3 Trusses spanning 60 feet or greater. The owner or the owner's authorized agent shall contract with a registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing for trusses with clear spans 60 feet (18 288 mm) or greater. Special inspection of trusses over 60 feet (18 288 mm) in length shall be in accordance with Section 1705*A*.2.

2211*A*.3.4 Truss quality assurance. Trusses not part of a manufacturing process that provides requirements for quality control done under the supervision of a third-party quality control agency, shall be manufactured in compliance with Sections 1704*A*.2.5 and 1705*A*.2, as applicable.

2211*A*.4 Structural wall stud design. Structural wall studs shall be designed in accordance with either AISI S211 or AISI S100.

Cold-formed steel stud foundation plates or sills shall be bolted or fastened to the foundation or foundation wall in accordance with Section 2304.3.4, Item 2.

2211*A*.5 Floor and roof system design. Framing for floor and roof systems in buildings shall be designed in accordance with either AISI S210 or AISI S100.

2211*A*.6 Lateral design. Light-frame shear walls, diagonal strap bracing that is part of a structural wall and diaphragms used to resist wind, seismic and other in-plane lateral loads shall be designed in accordance with AISI S213.

Shear wall assemblies in accordance with Section C2.2.3 of AISI-S213 are not permitted within the seismic force-resisting system of buildings.

2211*A*.7 Prescriptive framing. *Not permitted by DSA-SS and OSHPD.*

SECTION 2212A [DSA-SS]
LIGHT MODULAR STEEL MOMENT FRAMES FOR PUBLIC ELEMENTARY AND SECONDARY SCHOOLS, AND COMMUNITY COLLEGES

2212A.1 General.

2212A.1.1 Configuration. *Light modular steel moment frame buildings shall be constructed of factory-assembled modules comprising a single-story moment-resisting space frame supporting a floor and roof. Individual modules shall not exceed a width of 14 feet (4.25 m) nor a length of 72 feet (22 m). All connections of beams to corner columns shall be designed as moment-resisting in accordance with the criteria of Section 2212A.2. Modules may be stacked to form multistory structures not exceeding 35 feet or two stories in height. When stacked modules are evaluated separately, seismic forces on each module shall be distributed in accordance with Section 12.8.3 of ASCE 7, considering the modules in the stacked condition. See Section 2212A.2.5 of this code.*

2212A.1.2 Design, fabrication and erection. *The design, fabrication and erection of light modular steel moment-frame buildings shall be in accordance with the AISC Specification for Structural Steel Buildings (ANSI/AISC 360) and the AISI North American Specification for the Design of Cold Formed Structural Members (AISI/COS/NASPEC), as applicable, and the requirements of this section. The maximum dead load of the roof and elevated floor shall not exceed 25 psf and 50 psf (1197 Pa and 2394 Pa), respectively. The maximum dead load of the exterior walls shall not exceed 45 psf (2155 Pa).*

2212A.2 Seismic requirements. *In addition to the other requirements of this code, the design, materials and workmanship of light modular steel moment frames shall comply with the requirements of this section. The response modification coefficient R shall be equal to* $3^1/_2$. C_d *and* Ω_0 *shall be equal to 3.0.*

2212A.2.1 Base materials. *Beams, columns and connection materials shall be limited to those materials permitted under the AISC Specification for Structural Members (ANSI/AISC 360) and the AISI North American Specification for the Design of Cold-Formed Structural Members (AISI/COS/NASPEC).*

2212A.2.2 Beam-to-column strength ratio. *At each moment-resisting connection the following shall apply:*

$$\frac{\sum S_{bi} F_{ybi}}{\sum S_{cj} F_{ycj}} \geq 1.4 \qquad \textit{(Equation 22A-1)}$$

where:

F_{ybi} *= The specified yield stress of beam "i."*

F_{ycj} *= The specified yield stress of column "j."*

S_{bi} *= The flexural section modulus of each beam "i" that is moment connected to the column "j" at the connection.*

S_{cj} *= The flexural section modulus of each column "j" that is moment connected to the beam "i" at the connection.*

Exceptions:

1. *Beam-to-column connections at the floor level beams of first or second-story modules need not comply with this requirement.*
2. *Beam-to-column strength ratios less than 1.4 are allowed if proven to be acceptable by analysis or testing.*

2212A.2.3 Welding. *Weld filler metals shall be capable of producing weld metal with a minimum Charpy V-Notch toughness of 20 ft-lb at 0°F. Where beam bottom flanges attach to columns with complete joint penetration groove welds and weld backing is used at the bottom surface of the beam flange, such backing shall be removed and the root pass back-gouged, repaired and reinforced with a minimum* $^3/_{16}$ *inch (5 mm) fillet weld.*

2212A.2.4 Connection design. *Connections of beams to columns shall have the design strength to resist the maximum seismic load effect,* E_m, *calculated in accordance with Section 12.4.3 of ASCE 7.*

2212A.2.5 Multistory assemblies. *Analysis of multistory assemblies shall be permitted to consider the stacked modules as a single assembly, with restraint conditions between the stacked units that represent the actual method of attachment. Alternatively, it shall be permitted to analyze the individual modules of stacked assemblies independently, with lateral and vertical reactions from modules above applied as concentrated loads at the top of the supporting module.*

SECTION 2213A
TESTING AND FIELD VERIFICATION

2213A.1 Tests of high-strength bolts, nuts and washers. *High-strength bolts, nuts and washers shall be sampled and tested by an approved independent testing laboratory for conformance with the requirements of applicable ASTM standards.*

[OSHPD 1 and 4] *A minimum of three samples per lot, as defined in the ASTM standards for bolts [and not nuts and washers], shall be tested for tensile properties in accordance with ASTM F606, but need not exceed three samples per 400 bolts.*

2213A.2 Tests of end-welded studs. *End-welded studs shall be tested in accordance with the requirements of the AWS D1.1, Sections 7.7 and 7.8.* ||

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 23 – WOOD

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	**X**																				
Adopt entire chapter as amended (amended sections listed below)				**X**	**X**			**X**	**X**	**X**	**X**		**X**								
Adopt only those sections that are listed below			**X**																**X**		
Chapter / Section																					
2301.1				X																	
2301.1.1								X	X	X	X		X								
2301.1.2								X	X	X	X		X								
2301.1.3								X	X	X	X		X								
2301.1.3.1								X		X	X		X								
2301.1.3.2									X												
2301.1.4								X	X	X	X		X								
2301.2, Item 4, Exception										X	X		X								
2303.1.3.1								X	X	X	X		X								
2303.1.4.1								X	X	X	X		X								
2303.2 – 2303.2.9			X																		
2303.4.1.4.1, Exception 3								X	X	X	X		X								
2303.4.3.1								X	X	X	X		X								
2304.3.1.1				X																	
2304.3.4								X	X	X	X		X								
2304.4.1								X	X												
2304.5																					
2304.6.1										X			X								
2304.10.1.1								X		X	X		X								
2304.12.1.1.1																			X		
2304.12.1.2, Exception								X		X	X		X								
2304.12.1.4.1								X		X	X		X								
2304.12.8																			X		
2304.12.9																			X		
2305.1.2								X	X	X	X		X								
2308.1				X	X																
2308.2.7								X	X		X										
2309.1.1								X	X		X										

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 23

WOOD

SECTION 2301
GENERAL

2301.1 Scope. The provisions of this chapter shall govern the materials, design, construction and quality of wood members and their fasteners.

[HCD 1] For limited-density owner-built rural dwellings, owner-produced or used materials and appliances may be utilized unless found not to be of sufficient strength or durability to perform the intended function; owner-produced or used lumber, or shakes and shingles may be utilized unless found to contain dry rot, excessive splitting or other defects obviously rendering the material unfit in strength or durability for the intended purpose.

2301.1.1 Application. [DSA-SS, DSA-SS/CC & OSHPD 1, 2 & 4] *The scope of application of Chapter 23 is as follows:*

1. *Applications listed in Sections 1.9.2.1 and 1.9.2.2, regulated by the Division of the State Architect-Structural Safety (DSA-SS, and DSA-SS/CC). These applications include public elementary and secondary schools, community colleges and state-owned or state-leased essential services buildings.*
2. *Applications listed in Section 1.10, regulated by the Office of Statewide Health Planning and Development (OSHPD). These applications include hospitals, skilled nursing facilities, intermediate care facilities and correctional treatment centers.*

   Exception: *For applications listed in Section 1.10.3 (Licensed Clinics), the provisions of this chapter without OSHPD amendments identified in accordance with Section 2301.1.2 shall apply.*

2301.1.2 Identification of amendments. [DSA-SS, DSA-SS/CC & OSHPD 1, 2 & 4] *Amendments appear in this chapter preceded with the appropriate acronym, as follows:*

1. *Division of the State Architect - Structural Safety:*

   [DSA-SS] *- For applications listed in Section 1.9.2.1.*

   [DSA-SS/CC] *- For applications listed in Section 1.9.2.2*
2. *Office of Statewide Health Planning and Development:*

   [OSHPD 1] *- For applications listed in Section 1.10.1.*

   [OSHPD 2] *- For applications listed in Section 1.10.2.*

   [OSHPD 4] *- For applications listed in Section 1.10.4.*

2301.1.3 Reference to other chapters.

2301.1.3.1 [DSA-SS and OSHPD 1 & 4] *Where reference within this chapter is made to sections in Chapters 16, 17, 18, 19, 21, and 22, the provisions in Chapters 16A, 17A, 18A, 19A, 21A, and 22A, respectively shall apply instead.*

2301.1.3.2 [DSA-SS/CC] *Where reference within this chapter is made to sections in Chapters 17 and 18, the provisions in Chapters 17A and 18A respectively shall apply instead.*

2301.1.4 Prohibition. [DSA-SS & DSA-SS/CC & OSHPD 1, 2 & 4] *The following design methods, systems, and materials are not permitted by DSA and OSHPD:*

1. *Straight-sheathed horizontal lumber diaphragms.*
2. *Gypsum-based sheathing shear walls and portland cement plaster shear walls.*
3. *Shear wall foundation anchor bolt washers in accordance with exception to AWC SDPWS Section 4.3.6.4.3.*
4. *Wood structural panel shear walls and diaphragms using staples as fasteners.*
5. *Unblocked shear walls.*
6. *Any wood structural panel sheathing used for diaphragms and shear walls that are part of the seismic force-resisting system, not applied directly to framing members.*
7. *Single and double diagonally sheathed lumber walls used to resist seismic forces.*
8. *Log structures in accordance with ICC 400.*
9. *Cross-laminated timber used as part of the seismic force-resisting system, unless approved as an alternative system in accordance with Section 104.11.*

2301.2 General design requirements. The design of structural elements or systems, constructed partially or wholly of wood or wood-based products, shall be in accordance with one of the following methods:

1. Allowable stress design in accordance with Sections 2304, 2305 and 2306.
2. Load and resistance factor design in accordance with Sections 2304, 2305 and 2307.
3. Conventional light-frame construction in accordance with Sections 2304 and 2308.
4. AWC WFCM in accordance with Section 2309.
5. The design and construction of log structures in accordance with the provisions of ICC 400.

2301.3 Nominal sizes. For the purposes of this chapter, where dimensions of lumber are specified, they shall be deemed to be nominal dimensions unless specifically designated as actual dimensions (see Section 2304.2).

SECTION 2302
DEFINITIONS

2302.1 Definitions. The following terms are defined in Chapter 2:

ACCREDITATION BODY.

BRACED WALL LINE.

BRACED WALL PANEL.

COLLECTOR.

CONVENTIONAL LIGHT-FRAME CONSTRUCTION.

CRIPPLE WALL.

CROSS-LAMINATED TIMBER.

DIAPHRAGM, UNBLOCKED.

DRAG STRUT.

ENGINEERED WOOD RIM BOARD.

FIBERBOARD.

GABLE.

GRADE (LUMBER).

HARDBOARD.

NAILING, BOUNDARY.

NAILING, EDGE.

NAILING, FIELD.

D7672. Rim boards conforming to ANSI/APA PRR 410 shall be marked in accordance with that standard.

2303.2 Fire-retardant-treated wood. Fire-retardant-treated wood is any wood product which, when impregnated with chemicals by a pressure process or other means during manufacture, shall have, when tested in accordance with ASTM E84 or UL 723, a listed flame spread index of 25 or less and show no evidence of significant progressive combustion when the test is continued for an additional 20-minute period. Additionally, the flame front shall not progress more than $10^1/_2$ feet (3200 mm) beyond the centerline of the burners at any time during the test.

2303.2.1 Pressure process. For wood products impregnated with chemicals by a pressure process, the process shall be performed in closed vessels under pressures not less than 50 pounds per square inch gauge (psig) (345 kPa).

2303.2.2 Other means during manufacture. For wood products produced by other means during manufacture, the treatment shall be an integral part of the manufacturing process of the wood product. The treatment shall provide permanent protection to all surfaces of the wood product.

2303.2.3 Testing. For wood products produced by other means during manufacture, other than a pressure process, all sides of the wood product shall be tested in accordance with and produce the results required in Section 2303.2. Wood structural panels shall be permitted to test only the front and back faces.

2303.2.4 Labeling. Fire-retardant-treated lumber and wood structural panels shall be labeled. The label shall contain the following items:

1. The identification mark of an approved agency in accordance with Section 1703.5.
2. Identification of the treating manufacturer.
3. The name of the fire-retardant treatment.
4. The species of wood treated.
5. Flame spread and smoke-developed index.
6. Method of drying after treatment.
7. Conformance with appropriate standards in accordance with Sections 2303.2.5 through 2303.2.8.
8. For fire-retardant-treated wood exposed to weather, damp or wet locations, include the words "No increase in the listed classification when subjected to the Standard Rain Test" (ASTM D2898).

2303.2.5 Strength adjustments. Design values for untreated lumber and wood structural panels, as specified in Section 2303.1, shall be adjusted for fire-retardant-treated wood. Adjustments to design values shall be based on an approved method of investigation that takes into consideration the effects of the anticipated temperature and humidity to which the fire-retardant-treated wood will be subjected, the type of treatment and redrying procedures.

2303.2.5.1 Wood structural panels. The effect of treatment and the method of redrying after treatment, and exposure to high temperatures and high humidities on the flexure properties of fire-retardant-treated softwood plywood shall be determined in accordance with ASTM D5516. The test data developed by ASTM D5516 shall be used to develop adjustment factors, maximum loads and spans, or both, for untreated plywood design values in accordance with ASTM D6305. Each manufacturer shall publish the allowable maximum loads and spans for service as floor and roof sheathing for its treatment.

2303.2.5.2 Lumber. For each species of wood that is treated, the effects of the treatment, the method of redrying after treatment and exposure to high temperatures and high humidities on the allowable design properties of fire-retardant-treated lumber shall be determined in accordance with ASTM D5664. The test data developed by ASTM D5664 shall be used to develop modification factors for use at or near room temperature and at elevated temperatures and humidity in accordance with ASTM D6841. Each manufacturer shall publish the modification factors for service at temperatures of not less than 80°F (27°C) and for roof framing. The roof framing modification factors shall take into consideration the climatological location.

2303.2.6 Exposure to weather, damp or wet locations. Where fire-retardant-treated wood is exposed to weather, or damp or wet locations, it shall be identified as "Exterior" to indicate there is no increase in the listed flame spread index as defined in Section 2303.2 when subjected to ASTM D2898.

2303.2.7 Interior applications. Interior fire-retardant-treated wood shall have moisture content of not over 28 percent when tested in accordance with ASTM D3201 procedures at 92-percent relative humidity. Interior fire-retardant-treated wood shall be tested in accordance with Section 2303.2.5.1 or 2303.2.5.2. Interior fire-retardant-treated wood designated as Type A shall be tested in accordance with the provisions of this section.

2303.2.8 Moisture content. Fire-retardant-treated wood shall be dried to a moisture content of 19 percent or less for lumber and 15 percent or less for wood structural panels before use. For wood kiln-dried after treatment (KDAT), the kiln temperatures shall not exceed those used in kiln drying the lumber and plywood submitted for the tests described in Section 2303.2.5.1 for plywood and 2303.2.5.2 for lumber.

2303.2.9 Type I and II construction applications. See Section 603.1 for limitations on the use of fire-retardant-treated wood in buildings of Type I or II construction.

2303.3 Hardwood and plywood. Hardwood and decorative plywood shall be manufactured and identified as required in HPVA HP-1.

2303.4 Trusses. Wood trusses shall comply with Sections 2303.4.1 through 2303.4.7.

2303.4.1 Design. Wood trusses shall be designed in accordance with the provisions of this code and accepted engineering practice. Members are permitted to be joined by nails, glue, bolts, timber connectors, metal connector plates or other approved framing devices.

2303.4.1.1 Truss design drawings. The written, graphic and pictorial depiction of each individual truss shall be provided to the building official for approval prior to installation. Truss design drawings shall also be provided with the shipment of trusses delivered to the job site. Truss design drawings shall include, at a minimum, the information specified below:

1. Slope or depth, span and spacing;
2. Location of all joints and support locations;
3. Number of plies if greater than one;
4. Required bearing widths;
5. Design loads as applicable, including;
    5.1. Top chord live load;
    5.2. Top chord dead load;
    5.3. Bottom chord live load;
    5.4. Bottom chord dead load;
    5.5. Additional loads and locations; and
    5.6. Environmental design criteria and loads (wind, rain, snow, seismic, etc.).
6. Other lateral loads, including drag strut loads;
7. Adjustments to wood member and metal connector plate design value for conditions of use;
8. Maximum reaction force and direction, including maximum uplift reaction forces where applicable;
9. Metal-connector-plate type, size and thickness or gage, and the dimensioned location of each metal connector plate except where symmetrically located relative to the joint interface;
10. Size, species and grade for each wood member;
11. Truss-to-truss connections and truss field assembly requirements;
12. Calculated span-to-deflection ratio and maximum vertical and horizontal deflection for live and total load as applicable;
13. Maximum axial tension and compression forces in the truss members;
14. Required permanent individual truss member restraint location and the method and details of restraint/bracing to be used in accordance with Section 2303.4.1.2.

2303.4.1.2 Permanent individual truss member restraint. Where permanent restraint of truss members is required on the truss design drawings, it shall be accomplished by one of the following methods:

1. Permanent individual truss member restraint/bracing shall be installed using standard industry lateral restraint/bracing details in accordance with generally accepted engineering practice. Locations for lateral restraint shall be identified on the truss design drawing.
2. The trusses shall be designed so that the buckling of any individual truss member is resisted internally by the individual truss through suitable means (i.e., buckling reinforcement by T-reinforcement or L-reinforcement, proprietary reinforcement, etc.). The buckling reinforcement of individual members of the trusses shall be installed as shown on the truss design drawing or on supplemental truss member buckling reinforcement details provided by the truss designer.
3. A project-specific permanent individual truss member restraint/bracing design shall be permitted to be specified by any registered design professional.

2303.4.1.3 Trusses spanning 60 feet or greater. The owner or the owner's authorized agent shall contract with any qualified registered design professional for the design of the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing for all trusses with clear spans 60 feet (18 288 mm) or greater.

2303.4.1.4 Truss designer. The individual or organization responsible for the design of trusses.

2303.4.1.4.1 Truss design drawings. Where required by the registered design professional, the building official or the statutes of the jurisdiction in which the project is to be constructed, each individual truss design drawing shall bear the seal and signature of the truss designer.

Exceptions:

1. Where a cover sheet and truss index sheet are combined into a single sheet and attached to the set of truss design drawings, the single cover/truss index sheet is the only document required to be signed and sealed by the truss designer.
2. When a cover sheet and a truss index sheet are separately provided and attached to the set of truss design drawings, the cover sheet and the truss index sheet are the only documents required to be signed and sealed by the truss designer.
3. ***[DSA-SS, DSA-SS/CC and OSHPD 1, 2 & 4]*** *Exceptions 1 and 2 are not permitted by DSA and OSHPD.*

2303.4.2 Truss placement diagram. The truss manufacturer shall provide a truss placement diagram that identifies the proposed location for each individually designated truss and references the corresponding truss design draw-

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 24 – GLASS AND GLAZING

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	X		X	X	X						X										
Adopt entire chapter as amended (amended sections listed below)								X	X	X			X								
Adopt only those sections that are listed below																					
Chapter / Section																					
2403.2.1							X	X	X			X									
Table 2403.2.1							X	X	X			X									
2410 & Subsections							X	X	X			X									

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 24

GLASS AND GLAZING

SECTION 2401
GENERAL

2401.1 Scope. The provisions of this chapter shall govern the materials, design, construction and quality of glass, light-transmitting ceramic and light-transmitting plastic panels for exterior and interior use in both vertical and sloped applications in buildings and structures.

2401.2 Glazing replacement. The installation of replacement glass shall be as required for new installations.

SECTION 2402
DEFINITIONS

2402.1 Definitions. The following terms are defined in Chapter 2:

DALLE GLASS.

DECORATIVE GLASS.

SECTION 2403
GENERAL REQUIREMENTS FOR GLASS

2403.1 Identification. Each pane shall bear the manufacturer's mark designating the type and thickness of the glass or glazing material. The identification shall not be omitted unless approved and an affidavit is furnished by the glazing contractor certifying that each light is glazed in accordance with approved construction documents that comply with the provisions of this chapter. Safety glazing shall be identified in accordance with Section 2406.3.

Each pane of tempered glass, except tempered spandrel glass, shall be permanently identified by the manufacturer. The identification mark shall be acid etched, sand blasted, ceramic fired, laser etched, embossed or of a type that, once applied, cannot be removed without being destroyed.

Tempered spandrel glass shall be provided with a removable paper marking by the manufacturer.

2403.2 Glass supports. Where one or more sides of any pane of glass are not firmly supported, or are subjected to unusual load conditions, detailed construction documents, detailed shop drawings and analysis or test data ensuring safe performance for the specific installation shall be prepared by a registered design professional.

2403.2.1 Additional Requirements. [DSA-SS, DSA-SS/CC and OSHPD 1 & 4] *In addition to the requirements of Section 2403.2, glass supports shall comply with the following:*

1. *The construction documents and analysis or test data required per Section 2403.2 shall be submitted to the enforcement agency for approval.*
2. *Glass firmly supported on all four edges shall be glazed with minimum laps and edge clearances set forth in Table 2403.2.1.*

2403.3 Framing. To be considered firmly supported, the framing members for each individual pane of glass shall be designed so the deflection of the edge of the glass perpendicular to the glass pane shall not exceed $^1/_{175}$ of the glass edge length or $^3/_4$ inch (19.1 mm), whichever is less, when subjected to the larger of the positive or negative load where loads are combined as specified in Section 1605.

TABLE 2403.2.1
MINIMUM GLAZING REQUIREMENTS

FIXED WINDOWS AND OPENABLE WINDOWS OTHER THAN HORIZONTAL SIDING					
Glass Area	***Up to 6 sq. ft.***	***6 to 14 sq. ft.***	***14 to 32 sq. ft.***	***32 to 50 sq. ft.***	***Over 50 sq. ft.***
× 0.0929 for m², × 25.4 for mm					
1. Minimum Frame Lap	$^{1}/_{4}$"	$^{1}/_{4}$"	$^{5}/_{16}$"	$^{3}/_{8}$"	$^{1}/_{2}$"
2. Minimum Glass Edge Clearance	$^{1}/_{8}$"[1,2]	$^{1}/_{8}$"[1,2]	$^{3}/_{16}$"[1]	$^{1}/_{4}$"	$^{1}/_{4}$"[1]
3. Continuous Glazing Rabbet and Glass Retainer[3]	*Required*				
4. Resilient Setting Material[4]	*Not Required*	*Required*			
SLIDING DOORS AND HORIZONTAL SLIDING WINDOWS					
Glass Area		***Up to 14 sq. ft.***	***14 to 32 sq. ft.***	***32 to 50 sq. ft.***	***Over 50 sq. ft.***
× 0.0929 for m², × 25.4 for mm					
5. Minimum Glass Frame Lap		$^{1}/_{4}$"	$^{5}/_{16}$"	$^{3}/_{8}$"	$^{1}/_{2}$"
6. Minimum Glass Edge Clearance		$^{1}/_{8}$"[2]	$^{3}/_{16}$"	$^{1}/_{4}$"	$^{1}/_{4}$"
7. Continuous Glazing Rabbet and Glass Retainer[3]		*Required above third story*	*Required*		
8. Resilient Setting Material[4]		*Not Required*		*Required*	

1. *Glass edge clearance in fixed openings shall not be less than required to provide for wind and earthquake drift.*
2. *Glass edge clearance at all sides of pane shall be a minimum of $^{3}/_{16}$ inch (4.8 mm) where height of glass exceeds 3 feet (914 mm).*
3. *Glass retainers such as metal, wood or vinyl face stops, glazing beads, gaskets, glazing clips and glazing channels shall be of sufficient strength and fixation to serve this purpose.*
4. *Resilient setting material shall include preformed rubber or vinyl plastic gaskets or other materials which are proved to the satisfaction of the building official to remain resilient.*

2403.4 Interior glazed areas. Where interior glazing is installed adjacent to a walking surface, the differential deflection of two adjacent unsupported edges shall be not greater than the thickness of the panels when a force of 50 pounds per linear foot (plf) (730 N/m) is applied horizontally to one panel at any point up to 42 inches (1067 mm) above the walking surface.

2403.5 Louvered windows or jalousies. Float, wired and patterned glass in louvered windows and jalousies shall be no thinner than nominal $^{3}/_{16}$ inch (4.8 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

Wired glass with wire exposed on longitudinal edges shall not be used in louvered windows or jalousies.

Where other glass types are used, the design shall be submitted to the building official for approval.

SECTION 2404
WIND, SNOW, SEISMIC AND DEAD LOADS ON GLASS

2404.1 Vertical glass. Glass sloped 15 degrees (0.26 rad) or less from vertical in windows, curtain and window walls, doors and other exterior applications shall be designed to resist the wind loads due to ultimate design wind speed, V_{ult}, in Section 1609 for components and cladding. Glass in glazed curtain walls, glazed storefronts and glazed partitions shall meet the seismic requirements of ASCE 7, Section 13.5.9. The load resistance of glass under uniform load shall be determined in accordance with ASTM E1300.

The design of vertical glazing shall be based on Equation 24-1.

$$0.6F_{gw} \le F_{ga} \qquad \textbf{(Equation 24-1)}$$

where:

F_{gw} = Wind load on the glass due to ultimate design wind speed, V_{ult}, computed in accordance with Section 1609.

F_{ga} = Short duration load on the glass as determined in accordance with ASTM E1300.

2404.2 Sloped glass. Glass sloped more than 15 degrees (0.26 rad) from vertical in skylights, sunrooms, sloped roofs and other exterior applications shall be designed to resist the most critical combinations of loads determined by Equations 24-2, 24-3 and 24-4.

$$F_g = 0.6W_o - D \qquad \textbf{(Equation 24-2)}$$

$$F_g = 0.6W_i + D + 0.5\,S \qquad \textbf{(Equation 24-3)}$$

$$F_g = 0.3\,W_i + D + S \qquad \textbf{(Equation 24-4)}$$

where:

D = Glass dead load psf (kN/m²).

For glass sloped 30 degrees (0.52 rad) or less from horizontal,

= $13\,t_g$ (For SI: $0.0245\,t_g$).

For glass sloped more than 30 degrees (0.52 rad) from horizontal,

= $13\,t_g \cos\theta$ (For SI: $0.0245\,t_g \cos\theta$).

F_g = Total load, psf (kN/m²) on glass.

S = Snow load, psf (kN/m²) as determined in Section 1608.

t_g = Total glass thickness, inches (mm) of glass panes and plies.

shall apply to single glazing and all panes in multiple glazing.

Exception: Glazing that is more than 60 inches (1524 mm), measured horizontally and in a straight line, from the water's edge of a bathtub, hot tub, spa, whirlpool or swimming pool.

2406.4.6 Glazing adjacent to stairways and ramps. Glazing where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered a hazardous location.

Exceptions:

1. The side of a stairway, landing or ramp that has a guard complying with the provisions of Sections 1015 and 1607.8, and the plane of the glass is greater than 18 inches (457 mm) from the railing.
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

2406.4.7 Glazing adjacent to the bottom stairway landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 60 inches (1524 mm) above the landing and within a 60-inch (1524 mm) horizontal arc that is less than 180 degrees (3.14 rad) from the bottom tread nosing shall be considered a hazardous location.

Exception: Glazing that is protected by a guard complying with Sections 1015 and 1607.8 where the plane of the glass is greater than 18 inches (457 mm) from the guard.

2406.5 Fire department access panels. Fire department glass access panels shall be of tempered glass. For insulating glass units, all panes shall be tempered glass.

SECTION 2407
GLASS IN HANDRAILS AND GUARDS

2407.1 Materials. Glass used in a handrail, guardrail or a *guard* section shall be laminated glass constructed of fully tempered or heat-strengthened glass and shall comply with Category II or CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1. Glazing in railing in-fill panels shall be of an approved safety glazing material that conforms to the provisions of Section 2406.1.1. For all glazing types, the minimum nominal thickness shall be $^1/_4$ inch (6.4 mm).

Exception: Single fully tempered glass complying with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1 shall be permitted to be used in handrails and guardrails where there is no walking surface beneath them or the walking surface is permanently protected from the risk of falling glass.

2407.1.1 Loads. The panels and their support system shall be designed to withstand the loads specified in Section 1607.8. A design factor of four shall be used for safety.

2407.1.2 Support. Each handrail or guard section shall be supported by a minimum of three glass balusters or shall be otherwise supported to remain in place should one baluster panel fail. Glass balusters shall not be installed without an attached handrail or guard.

Exception: A top rail shall not be required where the glass balusters are laminated glass with two or more glass plies of equal thickness and the same glass type when approved by the building official. The panels shall be designed to withstand the loads specified in Section 1607.8.

2407.1.3 Parking garages. Glazing materials shall not be installed in handrails or guards in parking garages except for pedestrian areas not exposed to impact from vehicles.

2407.1.4 Glazing in wind-borne debris regions. Glazing installed in in-fill panels or balusters in wind-borne debris regions shall comply with the following:

2407.1.4.1 Balusters and in-fill panels. Glass installed in exterior railing in-fill panels or balusters shall be laminated glass complying with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1.

2407.1.4.2 Glass supporting top rail. When the top rail is supported by glass, the assembly shall be tested according to the impact requirements of Section 1609.1.2. The top rail shall remain in place after impact.

SECTION 2408
GLAZING IN ATHLETIC FACILITIES

2408.1 General. Glazing in athletic facilities and similar uses subject to impact loads, which forms whole or partial wall sections or which is used as a door or part of a door, shall comply with this section.

2408.2 Racquetball and squash courts.

2408.2.1 Testing. Test methods and loads for individual glazed areas in racquetball and squash courts subject to impact loads shall conform to those of CPSC 16 CFR Part 1201 or ANSI Z97.1 with impacts being applied at a height of 59 inches (1499 mm) above the playing surface to an actual or simulated glass wall installation with fixtures, fittings and methods of assembly identical to those used in practice.

Glass walls shall comply with the following conditions:

1. A glass wall in a racquetball or squash court, or similar use subject to impact loads, shall remain intact following a test impact.
2. The deflection of such walls shall be not greater than $1^1/_2$ inches (38 mm) at the point of impact for a drop height of 48 inches (1219 mm).

Glass doors shall comply with the following conditions:

1. Glass doors shall remain intact following a test impact at the prescribed height in the center of the door.
2. The relative deflection between the edge of a glass door and the adjacent wall shall not exceed the

thickness of the wall plus $^1/_2$ inch (12.7 mm) for a drop height of 48 inches (1219 mm).

2408.3 Gymnasiums and basketball courts. Glazing in multipurpose gymnasiums, basketball courts and similar athletic facilities subject to human impact loads shall comply with Category II of CPSC 16 CFR Part 1201 or Class A of ANSI Z97.1.

SECTION 2409
GLASS IN WALKWAYS, ELEVATOR HOISTWAYS AND ELEVATOR CARS

2409.1 Glass walkways. Glass installed as a part of a floor/ceiling assembly as a walking surface and constructed with laminated glass shall comply with ASTM E2751 or with the load requirements specified in Chapter 16. Such assemblies shall comply with the fire-resistance rating requirements of this code where applicable.

2409.2 Glass in elevator hoistway enclosures. Glass in elevator hoistway enclosures and hoistway doors shall be laminated glass conforming to ANSI Z97.1 or CPSC 16 CFR Part 1201.

2409.2.1 Fire-resistance-rated hoistways. Glass installed in hoistways and hoistway doors where the hoistway is required to have a fire-resistance rating shall also comply with Section 716.

2409.2.2 Glass hoistway doors. The glass in glass hoistway doors shall be not less than 60 percent of the total visible door panel surface area as seen from the landing side.

2409.3 Visions panels in elevator hoistway doors. Glass in vision panels in elevator hoistway doors shall be permitted to be any transparent glazing material not less than $^1/_4$ inch (6.4 mm) in thickness conforming to Class A in accordance with ANSI Z97.1 or Category II in accordance with CPSC 16 CFR Part 1201. The area of any single vision panel shall be not less than 24 square inches (15 484 mm^2) and the total area of one or more vision panels in any hoistway door shall be not more than 85 square inches (54 839 mm^2).

2409.4 Glass in elevator cars. Glass in elevator cars shall be in accordance with this section.

2409.4.1 Glass types. Glass in elevator car enclosures, glass elevator car doors and glass used for lining walls and ceilings of elevator cars shall be laminated glass conforming to Class A in accordance with ANSI Z97.1 or Category II in accordance with CPSC 16 CFR Part 1201.

Exception: Tempered glass shall be permitted to be used for lining walls and ceilings of elevator cars provided:

1. The glass is bonded to a nonpolymeric coating, sheeting or film backing having a physical integrity to hold the fragments when the glass breaks.
2. The glass is not subjected to further treatment such as sandblasting; etching; heat treatment or painting that could alter the original properties of the glass.
3. The glass is tested to the acceptance criteria for laminated glass as specified for Class A in accordance with ANSI Z97.l or Category II in accordance with CPSC 16 CFR Part 1201.

2409.4.2 Surface area. The glass in glass elevator car doors shall be not less than 60 percent of the total visible door panel surface area as seen from the car side of the doors.

SECTION 2410 [DSA-SS, DSA-SS/CC, OSHPD 1 & 4]
STRUCTURAL SEALANT GLAZING (SSG)

2410.1 General. *The requirements of this section address the use of structural sealant glazing (SSG). These requirements shall not be used for butt joint glazing, point supported glass, and glass fins.*

Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections 2410.1.1 through 2410.1.4.

2410.1.1 Design. *Design of structural sealant glazing (SSG) shall satisfy the following requirements:*

1. *SSG shall be weather tight and serviceable, as defined in AAMA 501.4, under design story drifts associated with the design earthquake and no glass fallout shall occur at the drifts determined by ASCE 7, Section 13.5.9.*
2. *The sealant utilized in the insulated glass units used in SSG shall be designed in accordance with ASTM C1249. The insulated glass unit design shall be in accordance with ASTM C1249, Section 6.7.2.*
3. *Allowable stress for SSG shall not exceed 20 psi and shall have a minimum factor of safety of 5 as required by ASTM C1401.*
4. *Design methodology shall address seismic movement in accordance with ASTM C1401, Section 30.3.4.*
5. *SSG systems shall be supported for self-weight and lateral loading at each floor level of the building.*
6. *Unitized SSG framing shall be anchored to the building floor bearing plate by screws or bolts and shall not rely upon gravity or frictional forces for attachment.*
7. *Framing shall satisfy the out-of-plane deflection requirements of this code.*

2410.1.2 Testing and inspection. *Testing and inspection of structural sealant glazing (SSG) shall satisfy the following requirements:*

a. *The seismic drift capability of structural sealant glazing shall be determined by tests in accordance with AAMA 501.6, AAMA 501.4 and ASCE 7, Section 13.5.9.2.*

b. *The applicability of the specific AAMA 501.6 and AAMA 501.4 testing shall be subject to approval by the building official.*

c. *The panel test specimens used in the AAMA 501.6 and AAMA 501.4 testing shall include all glass types*

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 26 – PLASTIC

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	X		X	X	X					X	X	X	X								
Adopt entire chapter as amended (amended sections listed below)								X	X												
Adopt only those sections that are listed below																					
Chapter / Section																					
2603.11.1								X	X												
2603.12.3								X	X												

The state agency does not adopt sections identified with the following symbol: †

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CHAPTER 26

PLASTIC

SECTION 2601
GENERAL

2601.1 Scope. These provisions shall govern the materials, design, application, construction and installation of foam plastic, foam plastic insulation, plastic veneer, interior plastic finish and trim, light-transmitting plastics and plastic composites, including plastic lumber. See Chapter 14 for requirements for exterior wall finish and trim.

SECTION 2602
DEFINITIONS

2602.1 Definitions. The following terms are defined in Chapter 2:

FIBER-REINFORCED POLYMER.

FOAM PLASTIC INSULATION.

LIGHT-DIFFUSING SYSTEM.

LIGHT-TRANSMITTING PLASTIC ROOF PANELS.

LIGHT-TRANSMITTING PLASTIC WALL PANELS.

PLASTIC, APPROVED.

PLASTIC COMPOSITE.

PLASTIC GLAZING.

PLASTIC LUMBER.

THERMOPLASTIC MATERIAL.

THERMOSETTING MATERIAL.

WOOD/PLASTIC COMPOSITE.

SECTION 2603
FOAM PLASTIC INSULATION

2603.1 General. The provisions of this section shall govern the requirements and uses of foam plastic insulation in buildings and structures.

2603.2 Labeling and identification. Packages and containers of foam plastic insulation and foam plastic insulation components delivered to the job site shall bear the label of an approved agency showing the manufacturer's name, product listing, product identification and information sufficient to determine that the end use will comply with the code requirements.

2603.3 Surface-burning characteristics. Unless otherwise indicated in this section, foam plastic insulation and foam plastic cores of manufactured assemblies shall have a flame spread index of not more than 75 and a smoke-developed index of not more than 450 where tested in the maximum thickness intended for use in accordance with ASTM E84 or UL 723. Loose fill-type foam plastic insulation shall be tested as board stock for the flame spread and smoke-developed indexes.

Exceptions:

1. Smoke-developed index for interior trim as provided for in Section 2604.2.
2. In cold storage buildings, ice plants, food plants, food processing rooms and similar areas, foam plastic insulation where tested in a thickness of 4 inches (102 mm) shall be permitted in a thickness up to 10 inches (254 mm) where the building is equipped throughout with an automatic fire sprinkler system

in accordance with Section 903.3.1.1. The approved automatic sprinkler system shall be provided in both the room and that part of the building in which the room is located.

3. Foam plastic insulation that is a part of a Class A, B or C roof-covering assembly provided the assembly with the foam plastic insulation satisfactorily passes NFPA 276 or UL 1256. The smoke-developed index shall not be limited for roof applications.
4. Foam plastic insulation greater than 4 inches (102 mm) in thickness shall have a maximum flame spread index of 75 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches (102 mm), provided the end use is approved in accordance with Section 2603.9 using the thickness and density intended for use.
5. Flame spread and smoke-developed indexes for foam plastic interior signs in covered and open mall buildings provided the signs comply with Section 402.6.4.

2603.4 Thermal barrier. Except as provided for in Sections 2603.4.1 and 2603.9, foam plastic shall be separated from the interior of a building by an approved thermal barrier of $^1/_2$-inch (12.7 mm) gypsum wallboard or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275. Combustible concealed spaces shall comply with Section 718.

2603.4.1 Thermal barrier not required. The thermal barrier specified in Section 2603.4 is not required under the conditions set forth in Sections 2603.4.1.1 through 2603.4.1.14.

2603.4.1.1 Masonry or concrete construction. A thermal barrier is not required for foam plastic installed in a masonry or concrete wall, floor or roof system where the foam plastic insulation is covered on each face by not less than 1-inch (25 mm) thickness of masonry or concrete.

2603.4.1.2 Cooler and freezer walls. Foam plastic installed in a maximum thickness of 10 inches (254 mm) in cooler and freezer walls shall:

1. Have a flame spread index of 25 or less and a smoke-developed index of not more than 450, where tested in a minimum 4-inch (102 mm) thickness.
2. Have flash ignition and self-ignition temperatures of not less than 600°F and 800°F (316°C and 427°C), respectively.
3. Have a covering of not less than 0.032-inch (0.8 mm) aluminum or corrosion-resistant steel having a base metal thickness not less than 0.0160 inch (0.4 mm) at any point.
4. Be protected by an automatic sprinkler system in accordance with Section 903.3.1.1. Where the cooler or freezer is within a building, both the cooler or freezer and that part of the building in which it is located shall be sprinklered.

2603.4.1.3 Walk-in coolers. In nonsprinklered buildings, foam plastic having a thickness that does not exceed 4 inches (102 mm) and a maximum flame spread index of 75 is permitted in walk-in coolers or freezer units where the aggregate floor area does not exceed 400 square feet (37 m^2) and the foam plastic is covered by a metal facing not less than 0.032-inch-thick (0.81 mm) aluminum or corrosion-resistant steel having a minimum base metal thickness of 0.016 inch (0.41 mm). A thickness of up to 10 inches (254 mm) is permitted where protected by a thermal barrier.

2603.4.1.4 Exterior walls-one-story buildings. For one-*story* buildings, foam plastic having a flame spread index of 25 or less, and a smoke-developed index of not more than 450, shall be permitted without thermal barriers in or on exterior walls in a thickness not more than 4 inches (102 mm) where the foam plastic is covered by a thickness of not less than 0.032-inch-thick (0.81 mm) aluminum or corrosion-resistant steel having a base metal thickness of 0.0160 inch (0.41 mm) and the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

2603.4.1.5 Roofing. A thermal barrier is not required for foam plastic insulation that is a part of a Class A, B or C roof-covering assembly that is installed in accordance with the code and the manufacturer's instructions and is either constructed as described in Item 1 or tested as described in Item 2.

1. The roof assembly is separated from the interior of the building by wood structural panel sheathing not less than 0.47 inch (11.9 mm) in thickness bonded with exterior glue, with edges supported by blocking, tongue-and-groove joints, other approved type of edge support or an equivalent material.
2. The assembly with the foam plastic insulation satisfactorily passes NFPA 276 or UL 1256.

2603.4.1.6 Attics and crawl spaces. Within an attic or crawl space where entry is made only for service of utilities, foam plastic insulation shall be protected against ignition by $1^1/_2$-inch-thick (38 mm) mineral fiber insulation; $^1/_4$-inch-thick (6.4 mm) wood structural panel, particleboard or hardboard; $^3/_8$-inch (9.5 mm) gypsum wallboard, corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm); $1^1/_2$-inch-thick (38 mm) self-supported spray-applied cellulose insulation in attic spaces only or other approved material installed in such a manner that the foam plastic insulation is not exposed. The protective covering shall be consistent with the requirements for the type of construction.

2603.4.1.7 Doors not required to have a fire protection rating. Where pivoted or side-hinged doors are permitted without a fire protection rating, foam plastic insulation, having a flame spread index of 75 or less and a smoke-developed index of not more than 450,

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 27 – ELECTRICAL

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter																					
Adopt entire chapter as amended (amended sections listed below)			X																		
Adopt only those sections that are listed below							X														
Chapter / Section																					
2702.2.5							X														
2702.2.6							X														
2702.2.15			X																		
2702.2.17			X																		

The state agency does not adopt sections identified with the following symbol: †

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CHAPTER 27

ELECTRICAL

SECTION 2701
GENERAL

2701.1 Scope. This chapter governs the electrical components, equipment and systems used in buildings and structures covered by this code. Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of the *California Electrical Code.*

SECTION 2702
EMERGENCY AND STANDBY POWER SYSTEMS

[F] 2702.1 Installation. Emergency power systems and standby power systems shall comply with Sections 2702.1.1 through 2702.1.7.

[F] 2702.1.1 Stationary generators. Stationary emergency and standby power generators required by this code shall be listed in accordance with UL 2200.

[F] 2702.1.2 Electrical. Emergency power systems and standby power systems required by this code or the *California Fire Code* shall be installed in accordance with the *California Fire Code*, NFPA 70, NFPA 110 and NFPA 111.

[F] 2702.1.3 Load transfer. Emergency power systems shall automatically provide secondary power within 10 seconds after primary power is lost, unless specified otherwise in this code. Standby power systems shall automatically provide secondary power within 60 seconds after primary power is lost, unless specified otherwise in this code.

[F] 2702.1.4 Load duration. Emergency power systems and standby power systems shall be designed to provide the required power for a minimum duration of 2 hours without being refueled or recharged, unless specified otherwise in this code.

[F] 2702.1.5 Uninterruptable power source. An uninterrupted source of power shall be provided for equipment when required by the manufacturer's instructions, the listing, this code or applicable referenced standards.

[F] 2702.1.6 Interchangeability. Emergency power systems shall be an acceptable alternative for installations that require standby power systems.

[F] 2702.1.7 Group I-2 occupancies. In Group I-2 occupancies, in new construction or where the building is substantially damaged, where an essential electrical system is located in flood hazard areas established in Section 1612.3, the system shall be located and installed in accordance with ASCE 24.

[F] 2702.2 Where required. Emergency and standby power systems shall be provided where required by Sections 2702.2.1 through 2702.2.16.

[F] 2702.2.1 Emergency alarm systems. Emergency power shall be provided for emergency alarm systems as required by Section 415.5.

[F] 2702.2.2 Elevators and platform lifts. Standby power shall be provided for elevators and platform lifts as required in Sections 1009.4, 1009.5, 3003.1, 3007.8 and 3008.8.

[F] 2702.2.3 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems required in Section 915 and the *California Fire Code*. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

[F] 2702.2.4 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[F] 2702.2.5 Exit signs. Emergency power shall be provided for exit signs as required in Section 1013.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[F] 2702.2.6 Group I-2 occupancies. Essential electrical systems for Group I-2 occupancies shall be in accordance with Section 407.10.

[F] 2702.2.7 Group I-3 occupancies. Emergency power shall be provided for power-operated doors and locks in Group I-3 occupancies as required in Section 408.4.2.

[F] 2702.2.8 Hazardous materials. Emergency or standby power shall be provided in occupancies with hazardous materials where required by the *California Fire Code*.

[F] 2702.2.9 High-rise buildings. Emergency and standby power shall be provided in high-rise buildings as required in Sections 403.4.8.

[F] 2702.2.10 Horizontal sliding doors. Standby power shall be provided for horizontal sliding doors as required in Section 1010.1.4.3. The standby power supply shall have a capacity to operate not fewer than 50 closing cycles of the door.

[F] 2702.2.11 Means of egress illumination. Emergency power shall be provided for means of egress illumination as required in Section 1008.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[F] 2702.2.12 Membrane structures. Standby power shall be provided for auxiliary inflation systems in permanent membrane structures as required in Section 3102.8.2. Standby power shall be provided for a duration of not less than 4 hours. Auxiliary inflation systems in temporary air-supported and air-inflated membrane structures shall be provided in accordance with Section 3103.10.4 of the *California Fire Code.*

[F] 2702.2.13 Pyrophoric materials. Emergency power shall be provided for occupancies with silane gas in accordance with the *California Fire Code.*

[F] 2702.2.14 Semiconductor fabrication facilities. Emergency power shall be provided for semiconductor fabrication facilities as required in Section 415.11.10.

[F] 2702.2.15 High-rise buildings *and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access.* Emergency and standby power shall be provided in high-rise buildings *and Group I-2 occupancies having occupied floors located more than 75 feet above the lowest level of fire department vehicle access* in accordance with Sections 403.4.7 and 403.4.8.

[F] 2702.2.15 Smoke control systems. Standby power shall be provided for smoke control systems as required in Sections 404.7, 909.11, 909.20.6.2 and 909.21.5.

[F] 2702.2.16 Underground buildings. Emergency and standby power shall be provided in underground buildings as required in Section 405.

2702.2.17 Group L-Occupancy. *Emergency power shall be provided in Group L occupancies in accordance with this chapter and Section 453.4.6.1.*

[F] 2702.3 Critical circuits. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

[F] 2702.4 Maintenance. Emergency and standby power systems shall be maintained and tested in accordance with the *California Fire Code*.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 30 – ELEVATORS AND CONVEYING SYSTEMS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	**X**							**X**	**X**		**X**	**X**	**X**								
Adopt entire chapter as amended (amended sections listed below)			**X**							**X**											
Adopt only those sections that are listed below				**X**	**X**	**X**	**X**														
Chapter / Section																					
3001.1				X	X	X															
3001.2			X																		
3001.3						X	X														
3001.4			X																		
3001.5			X																		
3002.4a – 3002.4.7a			X																		
3002.5			X																		
3002.9 – 3002.9.5			X																		
3003.2 – 3003.2.1.2			X																		
3003.3			X																		
3004.1			X																		
3004.3.1			X																		
3005.4.1			X																		
3006.5			X																		
3007.1			X																		
3007.2			X																		
3007.7.1			X																		
3007.7.4			X																		
3008.1.2			X																		
3008.2			X																		
3008.2.1			X																		
3008.3.1			X																		
3008.6			X																		
3008.8.1			X																		
3009										X											

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CHAPTER 30

ELEVATORS AND CONVEYING SYSTEMS

SECTION 3001
GENERAL

3001.1 Scope. This chapter governs the design, construction, installation, alteration and repair of elevators and conveying systems and their components.

3001.2 Referenced standards. Except as otherwise provided for in this code, the design, construction, installation, alteration, repair and maintenance of elevators and conveying systems and their components shall conform to *California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders,* ASME A90.1, ASME B20.1, ANSI MH29.1, ALI ALCTV and ASCE 24 for construction in flood hazard areas established in Section 1612.3.

3001.3 Accessibility. Passenger elevators *and platform (wheelchair) lifts* required to be accessible or to serve as part of an accessible means of egress shall comply with Section 1009 and either *Chapter 11A for applications listed in Section 1.8.2.1.2 regulated by the Department of Housing and Community Development or Chapter 11B for applications listed in Section 1.9.1 regulated by the Division of the State Architect—Access Compliance.*

3001.4 Change in use. A change in use of an elevator from freight to passenger, passenger to freight, or from one freight class to another freight class shall comply with *California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders.*

3001.5 Elevators utilized to transport hazardous materials. *Elevators utilized to transport hazardous materials shall also comply with the California Fire Code Section 2703.10.4*

SECTION 3002
HOISTWAY ENCLOSURES

3002.1 Hoistway enclosure protection. Elevator, dumbwaiter and other hoistway enclosures shall be shaft enclosures complying with Section 713.

3002.1.1 Opening protectives. Openings in hoistway enclosures shall be protected as required in Chapter 7.

Exception: The elevator car doors and the associated hoistway enclosure doors at the floor level designated for recall in accordance with Section 3003.2 shall be permitted to remain open during Phase I Emergency Recall Operation.

3002.1.2 Hardware. Hardware on opening protectives shall be of an approved type installed as tested, except that approved interlocks, mechanical locks and electric contacts, door and gate electric contacts and door-operating mechanisms shall be exempt from the fire test requirements.

3002.2 Number of elevator cars in a hoistway. Where four or more elevator cars serve all or the same portion of a building, the elevators shall be located in not fewer than two separate hoistways. Not more than four elevator cars shall be located in any single hoistway enclosure.

3002.3 Emergency signs. An approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exit stairways and not to use the elevators in case of fire. The sign shall read: IN CASE OF FIRE, ELEVATORS ARE OUT OF SERVICE. USE EXIT STAIRS.

Exceptions:

1. The emergency sign shall not be required for elevators that are part of an accessible means of egress complying with Section 1009.4.
2. The emergency sign shall not be required for elevators that are used for occupant self-evacuation in accordance with Section 3008.

3002.4 Elevator car to accommodate ambulance stretcher. Where elevators are provided in buildings four or more stories above, or four or more stories below, grade plane, not fewer than one elevator shall be provided for fire department emergency access to all floors. The elevator car shall be of such a size and arrangement to accommodate an ambulance stretcher 24 inches by 84 inches (610 mm by 2134 mm) with not less than 5-inch (127 mm) radius corners, in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall be not less than 3 inches (76 mm) in height and shall be placed inside on both sides of the hoistway door frame.

The following California sections replace the corresponding model code section for applications specified in section 1.11 for the Office of the State Fire Marshal.

3002.4a General stretcher requirements. *All buildings and structures with one or more passenger service elevators shall be provided with not less than one medical emergency service elevator to all landings meeting the provisions of Section 3002.4a.*

Exceptions:

1. *Elevators in structures used only by maintenance and operating personnel.*
2. *Elevators in jails and penal institutions.*
3. *Elevators in buildings or structures where each landing is at ground level or is accessible at grade level or by a ramp.*
4. *Elevator(s) in two-story buildings or structures equipped with stairs of a configuration that will accommodate the carrying of the gurney or stretcher as permitted by the local jurisdictional authority.*
5. *Elevators in buildings or structures less than four stories in height for which the local jurisdictional authority has granted an exception in the form of a written document.*

3002.4.1a Gurney size. *The medical emergency service elevator shall accommodate the loading and transport of an ambulance gurney or stretcher [maximum size 24 inches by 84 inches (610 mm by 2134 mm) with not less than 5-inch (127 mm) radius corners] in the horizontal position.*

3002.4.2a Hoistway doors. *The hoistway landing openings shall be provided with power-operated doors.*

3002.4.3a Elevator entrance openings and car size. *The elevator car shall be of such a size and arrangement to accommodate a 24-inch by 84-inch (610 mm by 2134 mm) ambulance gurney or stretcher with not less than 5-inch (127 mm) radius corners, in the horizontal, open position, shall be provided with a minimum clear distance between walls or between walls and door excluding return panels not less than 80 inches by 54 inches (2032 mm by 1372 mm), and a minimum distance from wall to return panel not less than 51 inches (1295 mm) with a 42-inch (1067 mm) side slide door.*

Exception: *The elevator car dimensions and/or the clear entrance opening dimensions may be altered where it can be demonstrated to the local jurisdictional authority's satisfaction that the proposed configuration will handle the designated gurney or stretcher with equivalent ease. Documentation from the local authority shall be provided to the Occupational Safety and Health Standards Board.*

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 31– SPECIAL CONSTRUCTION

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter								X	X	X	X	X	X								
Adopt entire chapter as amended (amended sections listed below)				X	X																
Adopt only those sections that are listed below	X		X				X														
Chapter / Section																					
3101			X																		
3102.1			X																		
3102.3.1			X																		
3103			X																		
3104			X																		
3104.2, *Exception 2*						X	X														
3105			X																		
3105.4			X																		
3106			X																		
3109				†	†																
3109.4.4-3109.6	X																				
3110			X																		
3111			X																		

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CHAPTER 31

SPECIAL CONSTRUCTION

SECTION 3101
GENERAL

3101.1 Scope. The provisions of this chapter shall govern special building construction including membrane structures, temporary structures, pedestrian walkways and tunnels, automatic vehicular gates, awnings and canopies, marquees, signs, and towers and antennas.

SECTION 3102
MEMBRANE STRUCTURES

3102.1 General. The provisions of Sections 3102.1 through 3102.8 shall apply to air-supported, air-inflated, membrane-covered cable, membrane-covered frame and tensile membrane structures, collectively known as membrane structures, erected for a period of 180 days or longer. Those erected for a shorter period of time shall comply with the *California Fire Code*. Membrane structures covering water storage facilities, water clarifiers, water treatment plants, sewage treatment plants, greenhouses and similar facilities not used for human occupancy are required to meet only the requirements of Sections 3102.3.1 and 3102.7. Membrane structures erected on a building, balcony, deck or other structure for any period of time shall comply with this section.

3102.1.1 Tensile membrane structures. Tensile membrane structures, including permanent and temporary structures, shall be designed and constructed in accordance with ASCE 55. The provisions in Sections 3102.3 through 3102.6 shall apply.

3102.2 Definitions. The following terms are defined in Chapter 2:

AIR-INFLATED STRUCTURE.

AIR-SUPPORTED STRUCTURE.

Double skin.

Single skin.

CABLE-RESTRAINED, AIR-SUPPORTED STRUCTURE.

MEMBRANE-COVERED CABLE STRUCTURE.

MEMBRANE-COVERED FRAME STRUCTURE.

NONCOMBUSTIBLE MEMBRANE STRUCTURE.

TENSILE MEMBRANE STRUCTURE.

3102.3 Type of construction. Noncombustible membrane structures shall be classified as Type IIB construction. Noncombustible frame or cable-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IIB construction. Heavy timber frame-supported structures covered by an approved membrane in accordance with Section 3102.3.1 shall be classified as Type IV construction. Other membrane structures shall be classified as Type V construction.

Exception: Plastic less than 30 feet (9144 mm) above any floor used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers is not required to meet the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.

3102.3.1 Membrane and interior liner material. Membranes and interior liners shall be either noncombustible as set forth in Section 703.5 or *shall be flame resistant in accordance with the provisions set forth in CCR, Title 19, Division 1, Chapter 8. Tops and sidewalls shall be made either from fabric that has been flame resistant treated with an approved exterior chemical process by an approved application concern, or from inherently flame resistant fabric approved and listed by the State Fire Marshal (see CCR, Title 19, Division 1, Chapter 8).*

Exception: Plastic less than 20 mil (0.5 mm) in thickness used in greenhouses, where occupancy by the general public is not authorized, and for aquaculture pond covers is not required to meet the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701.

3102.4 Allowable floor areas. The area of a membrane structure shall not exceed the limitations specified in Section 506.

3102.5 Maximum height. Membrane structures shall not exceed one story nor shall such structures exceed the height limitations in feet specified in Section 504.3.

Exception: Noncombustible membrane structures serving as roofs only.

3102.6 Mixed construction. Membrane structures shall be permitted to be utilized as specified in this section as a portion of buildings of other types of construction. Height and area limits shall be as specified for the type of construction and occupancy of the building.

3102.6.1 Noncombustible membrane. A noncombustible membrane shall be permitted for use as the roof or as a skylight of any building or atrium of a building of any type of construction provided the membrane is not less than 20 feet (6096 mm) above any floor, balcony or gallery.

3102.6.1.1 Membrane. A membrane meeting the fire propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 shall be permitted to be used as the roof or as a skylight on buildings of Type IIB, III, IV and V construction, provided the membrane is not less than 20 feet (6096 mm) above any floor, balcony or gallery.

3102.7 Engineering design. The structure shall be designed and constructed to sustain dead loads; loads due to tension or inflation; live loads including wind, snow or flood and seismic loads and in accordance with Chapter 16.

3102.7.1 Lateral restraint. For membrane-covered frame structures, the membrane shall not be considered to provide lateral restraint in the calculation of the capacities of the frame members.

3102.8 Inflation systems. Air-supported and air-inflated structures shall be provided with primary and auxiliary inflation systems to meet the minimum requirements of Sections 3102.8.1 through 3102.8.3.

3102.8.1 Equipment requirements. This inflation system shall consist of one or more blowers and shall include provisions for automatic control to maintain the required inflation pressures. The system shall be so designed as to prevent overpressurization of the system.

3102.8.1.1 Auxiliary inflation system. In addition to the primary inflation system, in buildings larger than 1,500 square feet (140 m^2) in area, an auxiliary inflation system shall be provided with sufficient capacity to maintain the inflation of the structure in case of primary system failure. The auxiliary inflation system shall operate automatically when there is a loss of internal pressure and when the primary blower system becomes inoperative.

3102.8.1.2 Blower equipment. Blower equipment shall meet all of the following requirements:

1. Blowers shall be powered by continuous-rated motors at the maximum power required for any flow condition as required by the structural design.
2. Blowers shall be provided with inlet screens, belt guards and other protective devices as required by the building official to provide protection from injury.
3. Blowers shall be housed within a weather-protecting structure.
4. Blowers shall be equipped with backdraft check dampers to minimize air loss when inoperative.
5. Blower inlets shall be located to provide protection from air contamination. The location of inlets shall be approved.

3102.8.2 Standby power. Wherever an auxiliary inflation system is required, an approved standby power-generating system shall be provided. The system shall be equipped with a suitable means for automatically starting the generator set upon failure of the normal electrical service and for automatic transfer and operation of all of the required electrical functions at full power within 60 seconds of such service failure. Standby power shall be capable of operating independently for not less than 4 hours.

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 34*A* – EXISTING STRUCTURES

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DPH	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter										X											
Adopt entire chapter as amended (amended sections listed below)																					
Adopt only those sections that are listed below																					
Chapter / Section																					

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pursuant to Section 1.11.

CHAPTER 34A

EXISTING STRUCTURES

SECTION 3401A
GENERAL

3401A.1 Scope. *The provisions of this chapter shall control the alteration, repair, addition and change of occupancy of existing structures for applications listed in Sections 1.10.1* ***[OSHPD 1]*** *regulated by the Office of Statewide Health Planning and Development (OSHPD).*

SFM and DSA-AC requirements for existing structures shall be enforced by the Office of Statewide Health Planning and Development (OSHPD).

[DSA-AC] For applications listed in Section 1.9.1 regulated by the Division of the State Architect-Access Compliance for accessibility requirements, see Chapter 11B.

3401A.1.1 Additions, alterations and repairs. *The additions, alterations and repairs shall follow one of the three procedures listed below:*

1. *Provisions in Sections 3403A, 3404A and 3405A; or*
2. *Nonconforming buildings provisions in Section 3411A; or*
3. *Performance based or prescriptive provisions in Section 3412A.*

Items 1 through 3 above shall not be applied in combination with each other, except when explicitly permitted.

The services/systems, utilities and means of egress shall satisfy requirements in Sections 3416A and 3417A.

3401A.2 Maintenance. *Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the building official shall have the authority to require a building or structure to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.*

3401A.3 Compliance. *Alterations, repairs, additions and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for alterations, repairs, additions and changes of occupancy or relocation, respectively, in the California Energy Code, California Fire Code, California Mechanical Code, California Plumbing Code and California Electrical Code, California Residential Code and NFPA 70. Where provisions of the other codes conflict with provisions of this chapter, the provisions of this chapter shall take precedence.*

3401A.4 Building materials, equipment and systems. *Building materials, equipment, and systems shall comply with the requirements of this section.*

3401A.4.1 Existing materials and equipment. *Materials and equipment already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the building official to be unsafe in accordance with Section 116.*

3401A.4.2 New and replacement materials and equipment. *Except as otherwise required or permitted by this code, materials and equipment permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs and alterations, provided no hazard to life, health or property is created. Hazardous* *materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.*

3401A.4.3 Existing seismic force-resisting systems. *Where the existing seismic force-resisting system is a type that can be designated ordinary or is a welded steel moment frame constructed under a permit issued prior to October 25, 1994, values of* R, Ω_0, *and* C_d *for the existing seismic force-resisting system shall be those specified by this code for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of a detailed, intermediate or special system.*

3401.5 Dangerous conditions. *The building official shall have the authority to require the elimination of conditions deemed dangerous.*

SECTION 3402A
DEFINITIONS

3402A.1 Definitions. *The following terms are defined in Chapter 2.*

DANGEROUS.

SUBSTANTIAL STRUCTURAL DAMAGE.

3402A.2 Definitions for this chapter. *The following words and terms shall, for the purposes of this chapter and as used elsewhere in the code, have the meanings shown herein. Definitions provided in Section 1613A.2, ASCE 7 Section 11.2 and ASCE 41 shall apply when appropriate in addition to terms defined in this section:*

CHANGE IN FUNCTION. *See Section 1224.3.*

EXISTING STRUCTURE. *A structure that has a valid certificate of occupancy issued by the building official.*

GENERAL ACUTE CARE HOSPITAL. *See Section 1224.3.*

NONSTRUCTURAL ALTERATION *is any alteration which neither affects existing structural elements nor requires new structural elements for vertical or lateral support and which does not increase the lateral shear force in any story by more than 5 percent.*

PEER REVIEW *refers to procedure contained in Section 3414A.*

REPAIR *as used in this chapter means all the design and construction work affecting existing or requiring new structural elements undertaken to restore or enhance the structural and nonstructural load resisting system participating in vertical or lateral response of a structure primarily intended to correct the effects of deterioration or impending or actual failure, regardless of cause.*

SPC SEISMIC SEPARATION. *Means a building separation in accordance with the California Administrative Code, Chapter 6 Section 3.4.*

UNREINFORCED MASONRY *as used in this chapter means masonry construction where reinforcements in any direction is less than minimum reinforcement specified in TMS 402 Section 7.3.2.6.*

UNREINFORCED CONCRETE *as used in this chapter means plain concrete as defined in ACI 318 Section 2.3.*

VOLUNTARY STRUCTURAL ALTERATION *is any alteration of existing structural element or provision of new structural elements which is not necessary for vertical or lateral support of other work and is initiated by the applicant primarily for the purpose of increasing the vertical or lateral load-carrying strength or stiffness of an existing building.*

SECTION 3403A
ADDITIONS

3403A.1 General. *Additions to any building or structure shall comply with the requirements of this code for new construction. Alterations to the existing building or structure shall be made to ensure that the existing building or structure together with the addition are no less conforming with the provisions of this code than the existing building or structure was prior to the addition. An existing building together with its additions shall comply with the height and area provisions of Chapter 5.*

3403A.2 Flood hazard areas. *For buildings and structures in flood hazard areas established in Section 1612A.3, any addition that constitutes substantial improvement of the existing structure, as defined in Section 202, shall comply with the flood design requirements for new construction, and all aspects of the existing structure shall be brought into compliance with the requirements for new construction for flood design.*

For buildings and structures in flood hazard areas established in Section 1612A.3, any additions that do not constitute substantial improvement of the existing structure, as defined in Section 202, are not required to comply with the flood design requirements for new construction.

3403A.3 Existing structural elements carrying gravity load. *Any existing gravity load-carrying structural element for which an addition and its related alterations cause an increase in design gravity load of more than 5 percent shall be strengthened, supplemented, replaced or otherwise altered as needed to carry the increased load required by this code for new structures. Any existing gravity load-carrying structural element whose gravity load-carrying capacity is decreased shall be considered an altered element subject to the requirements of Section 3404A.3. Any existing element that will form part of the lateral load path for any part of the addition shall be considered an existing lateral load-carrying structural element subject to the requirements of Section 3403A.4.*

3403A.3.1 Design live load. *Where the addition does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads approved prior to the addition. If the approved live load is less than that required by Section 1607A, the area designed for the nonconforming live load shall be posted with placards of approved design indicating the approved live load. Where the addition does result in increased design live load, the live load required by Section 1607A shall be used.*

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 35 – REFERENCED STANDARDS

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user. See Chapter 1 for state agency authority and building applications.)

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	**X**							**X**	**X**	**X**	**X**	**X**	**X**								
Adopt entire chapter as amended (amended sections listed below)			**X**	**X**	**X**	**X**															
Adopt only those sections that are listed below							**X**														
Chapter/Section																					
A227-06 (2011)				X	X																
A229-12				X	X																
ASME A17.1/CSA B44-13			*X*				X														
ASME A18.1-2008							*X*														
ASME BPE-2009			X																		
ASTM E648-04			X																		
ASTM E662-09			X																		
ASTM F1292-99							*X*														
ASTM F1292-04							*X*														
ASTM F1487-01							*X*														
ASTM F1951-99							*X*														
BHMA A156.10-2011							*X*														
BHMA A156.19-2013							*X*														
FM 3260-00			X																		
FM3011-99			X																		
FM4430-12			X																		
FM4430-80			X																		
ICC/ANSI A117.1-09				†	†	†															
ICC ES AC 331			X																		
ICC ES AC 77			X																		
NFPA 11-16			*X*																		
NFPA 13-*13*			X																		
NFPA 13D-*13*			X																		
NFPA 13R-*13*			X																		
NFPA 14-*13*			X																		
NFPA 15-*12*			X																		
NFPA 17-*13*			*X*																		
NFPA 17A-*13*			*X*																		
NFPA 20-*13*			*X*																		
NFPA 22-*13*			X																		
NFPA 24-*16*			X																		
NFPA 25-*13CA*																					
NFPA 31-11			*X*																		
NFPA 37-*15*																					
NFPA 52-13			*X*																		
NFPA 54-*15*			X																		
NFPA 61-13			X																		
NFPA 72-16			X				X														
NFPA 92-12			X																		
NFPA 99-12			X																		
NFPA 211-13			X																		
NFPA 259-13			X																		

(continued)

CALIFORNIA BUILDING CODE – MATRIX ADOPTION TABLE
CHAPTER 35 – REFERENCED STANDARDS—continued

Adopting agency	BSC	BSC-CG	SFM	HCD			DSA			OSHPD				BSCC	DHS	AGR	DWR	CEC	CA	SL	SLC
				1	2	1/AC	AC	SS	SS/CC	1	2	3	4								
Adopt entire chapter	X							X	X	X	X	X	X								
Adopt entire chapter as amended (amended sections listed below)			X	X	X	X															
Adopt only those sections that are listed below							X														
Chapter / Section																					
NFPA 275-13			X																		
NFPA 285-13			X																		
NFPA 288-13			X																		
NFPA 289-13			X																		
NFPA 409-*16*			X																		
NFPA 502-14			X																		
NFPA 654-13			X																		
NFPA 703-13			X																		
NFPA 720-15				X	X	X															
NFPA 1124-13			X																		
NFPA 2001-*15*			X																		
SFM 12-3			X																		
SFM 12-7-3			X																		
SFM 12-7A-1			X																		
SFM 12-7A-2			X																		
SFM 12-7A-3			X																		
SFM 12-7A-4			X																		
SFM 12-7A-4A			X																		
SFM 12-7A-5			X																		
SFM 12-8-100			X																		
SFM 12-10-1			X																		
SFM 12-10-2			X																		
SFM 12-10-3			X																		
UBC 15-2			X																		
UBC 15-3			X																		
UBC 15-4			X																		
UL 13-96			X																		
UL 38-99			X																		
UL 193-04			X																		
UL 199-95			X																		
UL 217-06			*X*																		
UL 228-97			X																		
UL 260-04			X																		
UL 262-04			X																		
UL 268A-98			X																		
UL 312-04			X																		
UL 346-05			X																		
UL 464-03			X																		
UL 497B-04			X																		
UL 521-99			X																		
UL 539-00			X																		
UL 632-00			X																		
UL 753-04			X																		
UL 813-96			X																		
UL 864-03			X																		
UL 2034-*2008*				X	X	X															
UL 2075-2013				*X*	*X*	*X*															

The state agency does not adopt sections identified with the following symbol: †

The Office of the State Fire Marshal's adoption of this chapter or individual sections is applicable to structures regulated by other state agencies pur su ant to Section 1.11.

CHAPTER 35

REFERENCED STANDARDS

This chapter lists the standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title, and the section or sections of this document that reference the standard. The application of the referenced standards shall be as specified in *Chapter 1, Scope and Administration, Division 1, Sections 1.1.5 and 1.1.7, and in Chapter 1, Scope and Administration, Division II,* Section 102.4, *as applicable.*

[DSA-SS, DSA-SS-CC & OSHPD 1 & 4] Reference to other chapters. *In addition to the code sections referenced, the standards listed in this chapter are applicable to the respective code sections in Chapters 16A, 17A, 18A, 19A, 21A and 22A.*

AA

Aluminum Association
1525 Wilson Boulevard, Suite 600
Arlington, VA 22209

Standard reference number	Title	Referenced in code section number
ADM1—2015	Aluminum Design Manual: Part 1—A Specification for Aluminum Structures	1604.3.5, 2002.1
ASM 35—00	Aluminum Sheet Metal Work in Building Construction (Fourth Edition)	2002.1

AAMA

American Architectural Manufacturers Association
1827 Waldon Office Square, Suite 550
Schaumburg, IL 60173

Standard reference number	Title	Referenced in code section number
1402—86	Standard Specifications for Aluminum Siding, Soffit and Fascia	1404.5.1
AAMA/WDMA/CSA 101/I.S.2/A440—08	North American Fenestration Standard/Specifications for Windows, Doors and Skylights	1709.5.1, 2405.5
501.4-09	*Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts*	*2410.1*
501.6-09	*Recommended Dynamic Test Method for Determining the Seismic Drift Causing Glass Fallout from a Wall*	*2410.1*

ACI

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331

Standard reference number	Title	Referenced in code section number
216.1—14	Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	Table 721.1(2), 722.1
318—14	Building Code Requirements for Structural Concrete	1604.3.2, 1615.3.1, 1615.4.1, 1704.5, Table 1705.3, 1705.3.2, 1705.12.1, 1808.8.2, Table 1808.8.2, 1808.8.5, 1808.8.6, 1810.1.3, 1810.2.4.1, 1810.3.2.1.1, 1810.3.2.1.2, 1810.3.8.3.1, 1810.3.8.3.3, 1810.3.9.4.2.1, 1810.3.9.4.2.2, 1810.3.10.1, 1810.3.11.1, 1901.2, 1901.3, 1902.1, 1903.1, 1904.1, 1904.2, 1905.1, 1905.1.1, 1905.1.2, 1905.1.3, 1905.1.4, 1905.1.5, 1905.1.6, 1905.1.7, 1905.1.8 1906.1, 2108.3, 2206.1, *Table 1705A.2.1, Table 1705A.3, 1810A.3.10.4, 1901.3.4.4, 1903A, 1904A, 1905A, 1910A.5.4, 1909.2, 1909.3*
355.2—07	*Qualification of Post-Installed Mechanical Anchors in Concrete & Commentary*	*1616A.1.19*
355.4—11	*Qualification of Post-Installed Adhesive Anchors in Concrete*	*1616A.1.19*
440.2R-08	*Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures*	*1911A.3*
503.7—07	*Specification for Crack Repair by Epoxy Injection*	*1911A.2*
506—05	*Guide to Shotcrete*	*1908A.1, 1908A.3, 1908A.12, 1911A.2*

ACI—continued

530—13	Building Code Requirements for Masonry Structures	1405.6, 1405.6.1, 1405.6.2, 1405.10, 1604.3.4, 1705.4, 1705.4.1, 1807.1.6.3, 1807.1.6.3.2, 1808.9, 2101.2, 2106.1, 2107.1, 2107.2, 2107.3, 2107.4, 2108.1, 2108.2, 2108.3, 2109.1, 2109.1.1, 2109.2, 2109.2.1, 2109.3, 2110.1, *2114.7, 2114.8, 2107A.5, 2107A.6*
530.1—13	Specifications for Masonry Structures	1405.6.1, 1705.4, 1807.1.6.3, 2103.1, 2103. 2.1, 2103.3, 2103.4, 2105.1

AISC

American Institute of Steel Construction
One East Wacker Drive, Suite 700
Chicago, IL 60601-18021

Standard reference number	Title	Referenced in code section number
341—10	Seismic Provisions for Structural Steel Buildings	1613.4.1, 1705.12.1.1, 1705.12.1.2, 1705.13.1.2, 2205.2.1.1, 2205.2.1.2, 2205.2.2, 2206.2.1, *1705A.2.1, 1707.2*,2, 1708.3, *2212.2, 2205A*, *2206A*
358-10	*Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications including Supplements No.1 & 2*	*2205A, 2206A.2, 2212.3, 3413A*
360—10	Specification for Structural Steel Buildings	722.5.2.2.1, 1604.3.3, 1705.2.1, 2203.1, 2203.2, 2205.1, 2205.2.1.1, 2206.1, *1705A.2.1, Table 1705A.2.1, 2212.1.1,2204A.4, 2212A.1.2. 2212A.2.1*

AISI

American Iron and Steel Institute
1140 Connecticut Avenue, 705
Suite 705
Washington, DC 20036

Standard reference number	Title	Referenced in code section number
AISI S100—*12*	North American Specification for the Design of Cold-formed Steel Structural Members, 2012	1604.3.3, 1905.1.8, 2203.1, 2203.2, *1905A.1, 1913.3.8, 2210A.2, 2211A.1, 2212A.1.2*
AISI S110—07/ S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems—Special Moment Frames, 2007 with Supplement 1, dated 2009 (Reaffirmed 2012)	2210.2
AISI S200—12	North American Standard for Cold-Formed Steel Framing-General Provisions	2203.1, 2203.2, 2211.1, Table 2603.12.1, Table 2603.12.2
AISI S210—07(2012)	North American Standard for Cold-Formed Steel Framing-Floor and Roof System Design (Reaffirmed 2012)	2211.5
AISI S211—07/ S1-12(2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, 2007 including Supplement 1, dated 2012 (Reaffirmed 2012)	2211.4
AISI S212—07(2012)	North American Standard for Cold-Formed Steel Framing-Header Design, 2007, (Reaffirmed 2012)	2211.2
AISI S213—07/ S1-09 (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (Reaffirmed 2012)	2211.6
S214—12	North American Standard for Cold-formed Steel Framing-Truss Design, 2012	2211A.3, 2211.3.1, 2211.3.2, 2212.5.1.2
AISI S220—11	North American Standard for Cold-formed Steel Framing-Nonstructural Members	2203.1, 2203.2, 2211.1, Table 2506.2, Table 2507.2
AISI S230—07/ S3-12(2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, 2007, with Supplement 3, dated 2012 (Reaffirmed 2012)	1609.1.1, 1609.1.1.1, 2211.7

ALI

Automotive Lift Institute
P.O. Box 85
Courtland, NY 13045

Standard reference number	Title	Referenced in code section number
ALI ALCTV—2011	Standard for Automotive Lifts—Safety Requirements for Construction, Testing and Validation (ANSI)	3001.2

DASMA

Door and Access Systems Manufacturers Association International
1300 Summer Avenue
Cleveland, OH 44115-2851

Standard reference number	Title	Referenced in code section number
ANSI/DASMA 107—1997 (R2012)	Room Fire Test Standard for Garage Doors Using Foam Plastic Insulation	2603.4.1.9
108—12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference	1709.5.2
115—12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure	1609.1.2.3

DOC

U.S. Department of Commerce
National Institute of Standards and Technology
1401 Constitution Avenue NW
Washington, DC 20230

Standard reference number	Title	Referenced in code section number
PS-1—09	Structural Plywood	2303.1.5, 2304.7, Table 2304.7(4), Table 2304.7(5), Table 2306.2(1), Table 2306.2(2)
PS-2—10	Performance Standard for Wood-based Structural-use Panels	2303.1.5, 2304.7, Table 2304.7(5), Table 2306.2(1), Table 2306.2(2)
PS 20—05	American Softwood Lumber Standard	202, 1810.3.2.4, 2303.1.1

DOL

U.S. Department of Labor
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

Standard reference number	Title	Referenced in code section number
29 CFR Part 1910.1000 (2009)	Air Contaminants	202

DOTn

U.S. Department of Transportation c/o Superintendent of Documents
1200 New Jersey Avenue, SE
Washington, DC 20402-9325

Standard reference number	Title	Referenced in code section number
49 CFR Parts 100—185 2005	Hazardous Materials Regulations	202
49 CFR Parts 173.137 (2009)	Shippers—General Requirements for Shipments and Packaging—Class 8—Assignment of Packing Group	202
49 CFR—1998	Specification of Transportation of Explosive and Other Dangerous Articles, UN 0335, UN 0336 Shipping Containers	202

FEMA

Federal Emergency Management Agency
Federal Center Plaza
500 C Street S.W. Washington, DC 20472

Standard reference number	Title	Referenced in code section number
352—00	*Recommended Postearthquake Evaluation and Repair Criteria for Welded Steel Moment-frame Buildings*	*3419.2*
FEMA-TB-11—01	Crawlspace Construction for Buildings Located in Special Flood Hazard Areas	1805.1.2.1

FM

Factory Mutual Global Research
Standards Laboratories Department
1301 Atwood Avenue, P.O. Box 7500
Johnston, RI 02919

Standard reference number	Title	Referenced in code section number
FM 1950—16	*American National Standard for Seismic Sway Braces for Pipe, Tubing and Conduit*	*1705A.13.2*
3260—00	*Radiant Energy-Sensing Fire Detectors for Automatic Fire Alarm Signaling.*	
3011—99	*Approval Standard for Central Station Service for Fire Alarm and Protective Equipment Supervision*	
FM 4430—12	*Approved Standard for Smoke and Heat Vents*	*910.3.2*
4430—80	*Acceptance Criteria for Smoke and Heat Vents*	*910.3.1*
4470 (2012)	Approval Standard for Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) And Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction	1504.7
4474 (2011)	American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures	1504.3.1, 1504.3.2
4880-2010	Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings and Exterior Wall Systems	2603.4, 2603.9

GA

Gypsum Association
810 First Street N.E. #510
Washington, DC 20002-4268

Standard reference number	Title	Referenced in code section number
GA 216—13	Application and Finishing of Gypsum Panel Products	Table 2508.1, 2509.2
GA 600—09	Fire-Resistance Design Manual, 20th Edition	Table 721.1(1), Table 721.1(2), Table 721.1(3)

HPVA

Hardwood Plywood Veneer Association
1825 Michael Faraday Drive
Reston, VA 20190

Standard reference number	Title	Referenced in code section number
HP-1—2013	Standard for Hardwood and Decorative Plywood	2303.3, 2304.7

ICC

International Code Council, Inc.
500 New Jersey Ave, NW
6th Floor
Washington, DC 20001

Standard reference number	Title	Referenced in code section number
ICC 300—12	ICC Standard on Bleachers, Folding and Telescopic Seating and Grandstands	1029.1.1, Table 1607.1
ICC 400—12	Standard on Design and Construction of Log Structures	2301.2
ICC 500—14	ICC/NSSA Standard on the Design and Construction of Storm Shelters	202, 423.1, 423.3, 423.4
ICC 600—14	Standard for Residential Construction in High-wind Regions	1609.1.1, 1609.1.1.1, 2308.2.1
*ICC-ES AC 01—15**	*Acceptance Criteria for Expansion Anchors in Masonry Elements*	*1616A.1.19*
*ICC-ES AC 58—15**	*Acceptance Criteria for Adhesive Anchors in Masonry Elements*	*1616A.1.19*

NFPA—continued

Amend Section 5.3.3.7 to read as follows:

5.3.3.7 Alternate Egress. At least two means of egress remote from each other shall be provided from each station platform as follows:

(1)*A means of egress used as a public circulation route shall be permitted to provide more than 50 percent of the required egress capacity from a station platform or other location.

(2) Means of egress from separate platforms shall be permitted to converge.

(3) Where means of egress routes from separate platforms converge, the subsequent capacity of the egress route shall be sufficient to maintain the required evacuation time from the incident platform.

(4) Enclosed station platforms shall have a minimum of one exit within 2.5 times the least width of the enclosed station platform up to a maximum of 50 feet (insert mm) from each end.

(5) Routes from platform ends into the underground guideway shall not be considered as exits for calculating exiting requirements.

Amend Section 5.3.11.1 to read as follows:

5.3.11.1 Illumination of the means of egress in stations, including escalators that are considered a means of egress, shall be in accordance with *Chapter 10* of the *California Building Code*.

Amend Section 5.3.11.2 to read as follows:

5.3.11.2 Means of egress, including escalators considered as means of egress, shall be provided with a system of emergency lighting in accordance with *Chapter 10* of the *California Building Code.*

Amend Section 5.4.1.1 to read as follows:

5.4.1.1 Enclosed stations shall be provided with a fire command center in accordance with *Section 911.1.1 through 911.5 of the California Building Code.*

Amend Section 5.4.4.1 to read as follows:

5.4.4.1* An automatic sprinkler protection system shall be provided *where required by Section 903 of the California Building Code.*

Delete Section 5.4.4.2.

Amend Section 5.4.5.1 to read as follows:

5.4.5.1* Class I standpipes shall be installed *where required by Chapter 9 of the California Building Code* in accordance with NFPA 14 except as modified herein.

Amend Section 7.3.2.1 to read as follows:

7.3.2.1 The fan inlet airflow hot temperature shall be determined by an engineering analysis, however, this temperature shall not be less than *482*°C (*250*°F). *Ventilation fans and related components shall be capable of withstanding the maximum anticipated plus/minus pressure transients induced by train operations.*

Add Section 7.6.1.1 to read as follows:

7.6.1.1 *Ventilation of stations shall not terminate at grade on any vehicle roadway.*

Amend Section 7.7.1 to read as follows:

7.7.1 Operation of the emergency ventilation system components shall be *capable of automatic and manual initiation in accordance with 909.12.3 of the California Building Code.*

Amend Section 7.8.1 to read as follows:

7.8.1 The design of the power for the emergency ventilation system shall comply with the requirements of Article 700 of *the California Electrical Code and Section 909 of the California Building Code.*

170—15	Standard for Fire Safety and Emergency Symbols	1025.2.6.1
211—13	Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances	2112.5
221—15	Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls	706.2
252—12	Standard Methods of Fire Tests of Door Assemblies	715.4.2, 715.4.3, 715.4.7.3.1, Table 716.3, 716.3.1, 716.4, 716.5.1, 716.5.3, 716.5.8, 716.5.8.1.1
253—15	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	406.8.3, 424.2, 804.2, 804.3
257—12	Standard for Fire Test for Window and Glass Block Assemblies	Table 716.3, 716.4, 716.5.3.2, 716.6, 716.6.1, 716.6.2, 716.6.7.3

NFPA—continued

259—13	Test Method for Potential Heat of Building Materials	2603.4.1.10, 2603.5.3
265—11	Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings on Full Height Panels and Walls	803.1.3, 803.1.3.1
268—12	Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source	1406.2.1.1, 1406.2.1.1.1, 1406.2.1.1.2, 2603.5.7, D105.1
275—13	Standard Method of Fire Tests for the Evaluation of Thermal Barriers	1407.10.2, 2603.4
276—11	Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies With Combustible Above-Deck Roofing Components	1508.1, 2603.3, 2603.4.1.5
285—12	Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components	718.2.6, 1403.5, 1407.10.4, 1409.10.4, 1510.6.2, 2603.5.5
286—15	Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	402.6.4.4, 803.1.2, 803.1.2.1, 803.11, 2603.4, 2603.7.2, 2603.9, 2604.2.4, 2614.4
288—12	Standard Methods of Fire Tests of Horizontal Fire Door Assemblies Installed in Horizontal in Fire-resistance-rated *Assemblies*	712.1.13.1
289—13	Standard Method of Fire Test for Individual Fuel Packages	402.6.2, 424.2
409—*16*	Aircraft Hangars	412.4.6, Table 412.4.6, 412.4.6.1, 412.6.5
418—11	Standard for Heliports	412.8.4
484—15	Standard for Combustible Metals	426.1
502—14	*Standard for Road Tunnels, Bridges, and Other Limited Access Highways*	*429*
654—13	Standard for the Prevention of Fire & Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids	426.1
655—12	Standard for the Prevention of Sulfur Fires and Explosions	426.1
664—12	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	426.1
701—10	Standard Method of Fire Tests for Flame-Propagation of Textiles and Films	410.3.6, 424.2, 801.4, 806.1, 806.3, 806.4, 3102.3, 3102.3.1, 3102.6.1.1, 3105.4, D102.2.8, H106.1.1
704—12	Standard System for the Identification of the Hazards of Materials for Emergency Response	202, 415.5.2
720—15	Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment	*915.4.1, 915.5.1, 915.5.2, 915.6, 915.7*
1124—*13*	Manufacture, Transportation, Storage *and Retail Sales* of Fireworks and Pyrotechnic Articles	415.6.1.1
2001—15	Clean Agent Fire Extinguishing Systems, *as amended**	Table 901.6.1, 904.10

****NFPA 2001, Amended Sections as follows:***

Add Sections 4.3.5.1.1 and 4.3.5.2.1 to read as follows:

4.3.5.1.1 *Alarms signals from the fire extinguishing system shall not interfere with the building fire alarm signal.*

4.3.5.2.1 *The lens on visual appliances shall be "red" in color.*

Exception: Other lens colors are permitted where approved by the enforcing agency.

PCI

Precast Prestressed Concrete Institute
209 W. Jackson Boulevard, Suite 500
Chicago, IL 60606-6938

Standard reference number	Title	Referenced in code section number
MNL 124—11	Design for Fire Resistance of Precast Prestressed Concrete	722.2.3.1
MNL 128—01	Recommended Practice for Glass Fiber Reinforced Concrete Panels	1903.3
PCI 120—10	*PCI Design Handbook 7th Edition.*	*1905A.1.1, 1905A.1.2*

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HISTORY NOTE APPENDIX

California Building Code
Title 24, Part 2, California Code of Regulations (CCR)

For prior code history, see the History Note Appendix to the *California Building Code* 2013 Triennial Edition, effective January 1, 2014.

1. (BSC 05/15, SFM 06/15, DSA-AC 01/15, DSA-SS 02/15, HCD 03/15, OSHPD 02/15 & 04/15, SLC 01/15) - Adopt the 2015 edition of the *International Building Code* published by the International Code Council, for incorporation into the 2016 *California Building Code,* CCR Title 24, Part 2 with amendments for State regulated occupancies, effective on January 1, 2017.
2. Errata to correct editorial errors within the preface as well as throughout various chapters in this code. Effective January 1, 2017.

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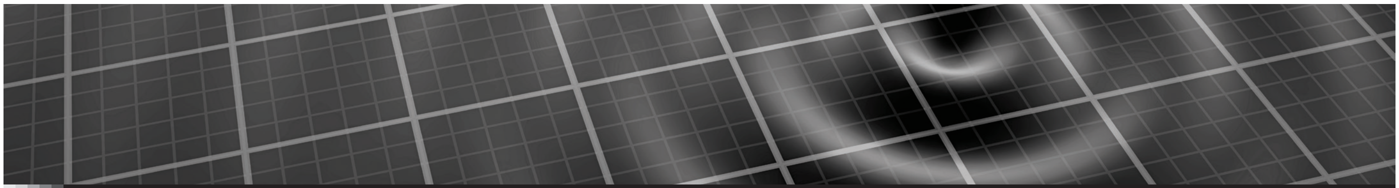

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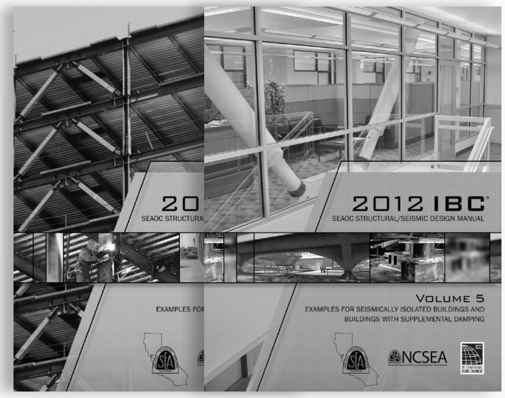

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